

In This Issue—Applying Fundamentals Is Keynote of Selling Service

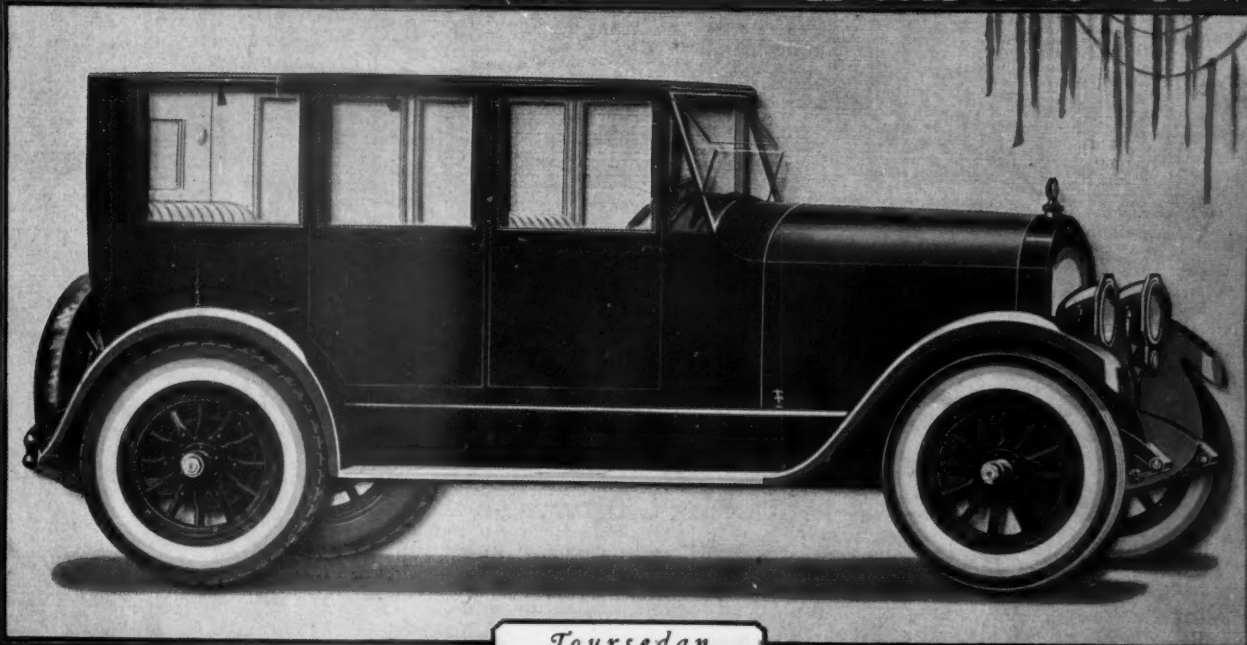
MOTOR AGE

Vol. XL
Number 17

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CHICAGO, OCTOBER 27, 1921

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Three Dollars a Year

THERE'S A TOUCH OF TOMORROW IN ALL COLE DOES TODAY



Toursedan

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The claim to superiority of the Cole Aero-EIGHT is based not alone on distinctive design, but on such correct engineering, fine quality and careful work-

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COLE MOTOR CAR COMPANY, INDIANAPOLIS, U. S. A.

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HIGH priced piston rings have kept many a repair job out of your shop, when a set of 50c No-Leak-O rings would have made a new customer for you. They not only satisfy your customers but bring you the repair work on which the bulk of your profit is made.

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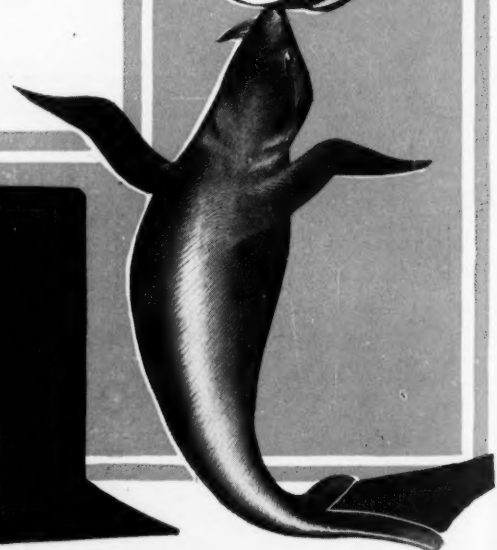
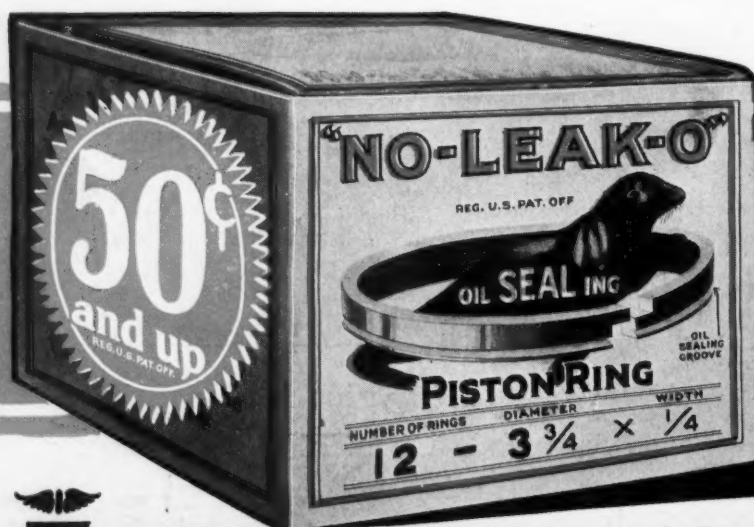
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Baltimore, Maryland



NO-LEAK-O *Piston Rings*
WITH THE ORIGINAL OIL SEALING GROOVE



MOTOR AGE

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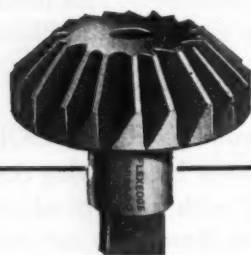
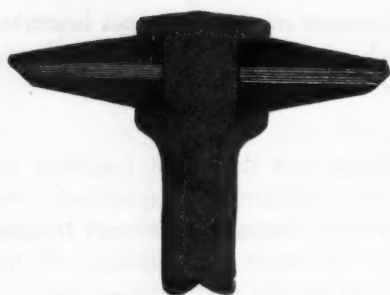
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The profit you make is mighty good—and you strengthen your reputation as an up-to-the-minute efficient repair man. Your jobber can supply you.

Send For This New Catalog

It contains valuable data on cars, trucks and tractors as well as all sizes of FLEX-EDGE Valves. A copy will be mailed free.

Self-Seating Valve Co.

340 W. Huron St., Chicago, U. S. A.



MOTOR AGE



How A Blacksmith Sold Service

JUST the other day a man, his wife and boy finished a 3000-mile motor trip, during which over a hundred automobile establishments were visited. These visits sometimes were forced owing to repairs, and sometimes not.

On one occasion a dealer sent the motorists to a blacksmith shop, because that was the only place in town where a little forge job could be executed. It was a chilly day. The blacksmith, a middle-aged man who had "learned his trade," soon sized up the job and then asked in a cheery voice, "Won't you all come in and have a chair around my fire, it's good and warm?" Not a single automobile man had invited them into a "rest room" or even the salesroom while their car was held up for a time in the service department.

The blacksmith sold himself and his institution because he knew fundamentals, something which most service stations have as yet to learn.

Applying Fundamentals Is Keynote of Selling Service

There Is a Right and Wrong Method of Selling Service. The Dealer Either Uses Good or Poor Methods. There Cannot Be a Twilight Zone

By B. M. Ikert

THOSE who have delved into the various phases of automotive vehicle maintenance at this time know the service station, large or small, which is selling its work successfully is doing so largely because those at the helm know fundamentals.

There may be two automobile dealers in the same town, on the same street and handling sales and service on cars of about the same price class, yet one may be successful in his business, while the other is not.

The first knows fundamentals of business, while the other has this still to learn.

One of the worst evils of present-day service is the fact that too many engaged in the business work only superficially. They do not get down to fundamentals. They think only of the immediate job and fail to analyze the future of their business.

This industry is not as old as some of the other well-established lines, consequently there are many things yet to be learned. Take watch-making or repairing. This is a line of work that requires years of experience. There are certain pieces of apparatus, also, which every watchmaker finds he cannot get along without. His equipment may cost anywhere from \$100 to \$300. Now, the point is, a watchmaker tools up to the sum of, say \$200, to render service on watches costing from \$5 to \$200, because he knows that to do the work properly he must have this equipment. What is more, the customer who has his watch repaired leaves it in full confidence that the work will be properly done, because time has instilled in our minds respect for the sign, "Watch Repairing." These places have become institutions with us. We know a watchmaker must pass through just so many years of experience before he hangs out his shingle.

Now what of the automotive service station, or the repairshop? First take the equipment. Does the same thing hold true as with the watch repair business? Size up the average shop and you will say—No!

If the same ratio of costs existed between the equipment of the automotive shop and the automobile, as exists between the costs of the watchmaker's equipment and a watch, our service stations would have to tool up at least to the extent of about \$2000.

There was a case only recently where

a dealer in one of the larger western towns wondered why he was not getting all the service work he knew he ought to get from his territory. Potentially he knew what the business was, but why he was not getting it and how to get it, were stumping him.

The trouble with this dealer was he was trying to do business on too small an investment, as regards his shop. The

Why This Shop Installed a Cylinder Grinder

WHEN one thinks of a cylinder regrinding machine he hardly can imagine one of these expensive machines in any but a large town machine shop or in a good-sized service station.

Yet there is a dealer in a small town—less than 2,000—of Nebraska who, among other machines like engine lathes, drill presses, grinders, etc., has a cylinder regrinder. On this machine he can handle any engine block, from a Ford to the large blocks of the gigantic tractors operating in that territory.

Why a cylinder regrinder in such a small town? Just this:

This dealer knew the potential repair work in that territory. He knew by equipping his shop as completely as the large machine shops of the country he could handle any class of work, except gear cutting. He does work for the farmers on their agricultural implements and as a result naturally gets all their automobile work. He gets work and is busy summer and winter because he can handle it—RIGHT.

car he handled sells for over \$2,000. Now, if we apply once more the ratio of costs as existing between the watchmaker's equipment and a watch, this dealer should have had equipment in his shop worth about \$2000.

But he had in his shop just two vises, totaling \$40, a blacksmith's drill press costing \$12, and an arbor press costing \$75. There isn't a shop in the country with an investment in tool equipment of \$127 that can successfully sell service on a car costing over \$2000.

This shop we just mentioned did not even have in it an electric hand drill, an article to be found in almost every small

shop these days. Lack of equipment slowed up the work in this shop. It meant customers had to wait longer for their cars than they should.

It meant that repair work would be done in a slipshod manner. It meant too much of the hammer and monkey wrench type of mechanics. It meant dissatisfaction on the part of the men in the shop. One of them made the statement that the foreman or "service manager" didn't know much about the work, but that he had a "drag" with the "old man" and, therefore, held his job. This same mechanic also said that many a job went out of the place improperly done, because it was "easy to slip it over on the foreman."

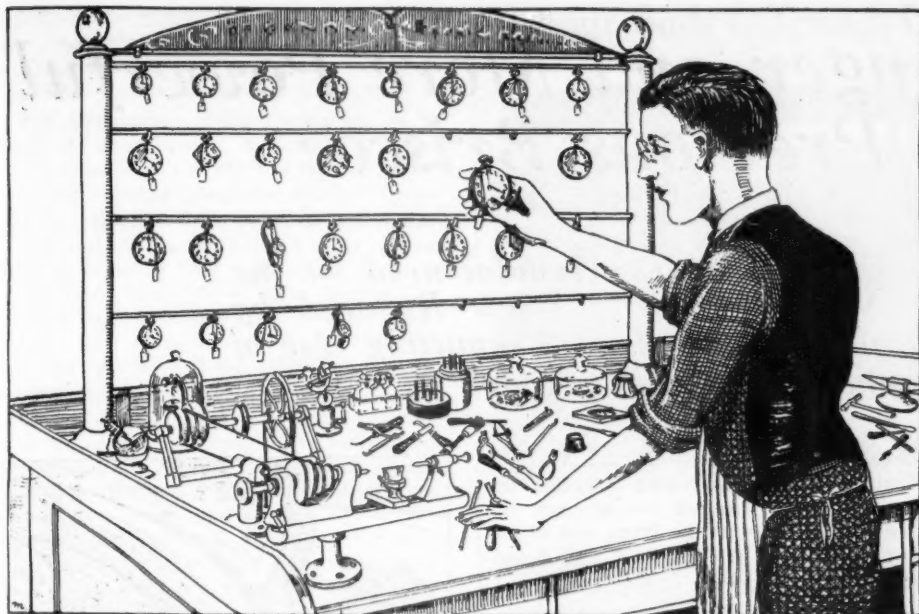
All of which brings us back to the question of fundamentals. The dealer in this case had not gone deeply enough into the subject. He thought as long as he was in the front office talking with customers and prospects, all was well. He never thought of what was happening at the rear door of his establishment. He might see men in overalls taking transmissions apart, or cleaning carbon from an engine and assume that his service was as good as any. Customers are not likely always to complain to the dealer himself. They would rather cuss the service work and take their cars to another shop.

We know of a case where practically the same thing existed and then the dealer took steps to find out what was wrong. He went over his sales records to see to whom he had sold cars. He then checked over his service work reports and noted that almost 50 per cent of those people to whom he had sold cars, seldom, if ever, came near his place. Then he went after these owners. He made it a point to see as many as possible personally and question them.

By degrees he found out that these owners were dissatisfied with service conditions as they existed in his place. One owner said that his wife hated to drive into the service station because on a former occasion an irresponsible mechanic had made an insolent remark.

Another owner said that he had been "robbed" for the work done, and that the fellows in the shop had used his own jack and ruined it.

Still another owner who was a mechanical engineer and good mechanic himself had watched some of the men work on a job and was horrified at their methods. He was not ready to trust them with his car. Then there were



owners who did not like the lack of system, inability to know what the job was going to cost them, manner of delivering the car with grease marks on the body or a grimy steering wheel, failure to keep promises, lack of courtesy and other things of a similar nature.

After this dealer made his survey he came back to his institution with new blood in his veins. He had been awakened to new things. He realized that his customers were very human and liked those things which he liked and disliked those things which were distasteful to him. He began a system of housecleaning. He had conferences with his men, some of them new men. He had let others go. He provided a place for women customers to sit down while waiting for short service jobs.

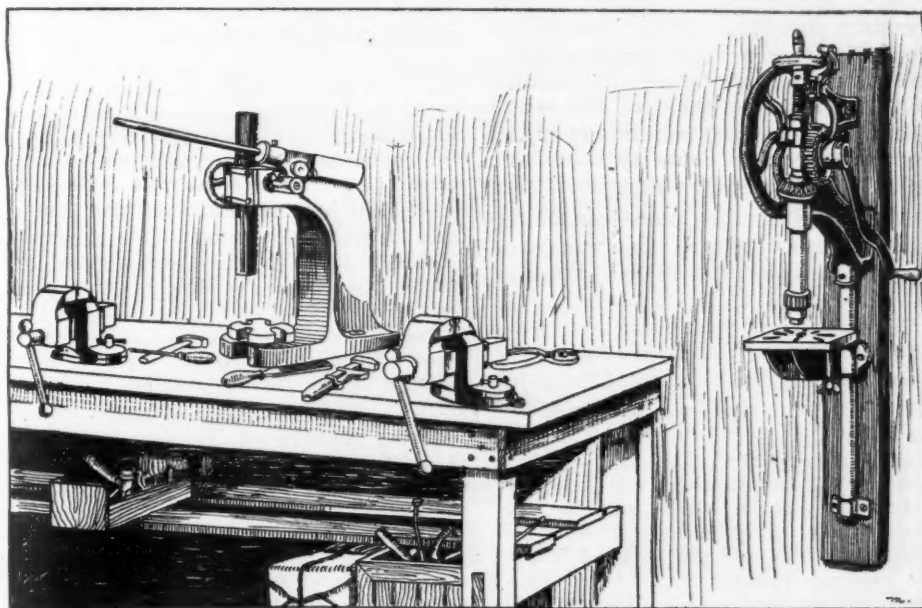
He did those things which spell success for any line of business, and the result is that today he has won back nearly all of the service work he should have had in the first place. What is more, it has helped him in his sales. And he is not through. He still seeks ways and means for bettering his service.

There is another case of an organization's applying fundamentals to its business and doing a nice business as a result. In a small town of Nebraska, a town of less than 2000 people, there is a dealer who has one of the most completely equipped shops ever noted in automotive repair work. This shop is prepared to do anything except cutting gears. There are two lathes in it, several drill presses, a cylinder-regrinding machine, welding outfits, forge, arbor presses and other equipment too numerous to mention.

Naturally the question comes up, "Why all this equipment in so small a community?" It is for this reason: In this part of Nebraska there are many tractors. The county is supposed to have a car for every four persons. There are farm trucks, too. This dealer knew that all this equipment must be maintained properly. He knew that there were hundreds of cylinders that would

↑
THE watchmaker has an investment in tools and machinery which may cost him anywhere from \$100 to \$300. He sells service on watches costing anywhere from \$5 to \$200.

↓
THE automotive service station, some of them, at least, may have a total investment of about \$125 and then expect to sell service properly on a product costing \$2500.



need regrinding eventually, so he installed the grinder.

Work is sent to him from a radius of hundreds of miles. The shop does a lot of miscellaneous work for farmers, such as pointing and sharpening plough shares, making brackets for wagons, welding broken parts, etc., with the re-

sult that the farmers are sold on the place and naturally bring their cars and trucks there for repairs. The shop is busy summer and winter. It is true that new car sales in this territory are not what they might be, but the shop is making money. The dealer knew the potential service work of the community and then tooled up for it. He got it.

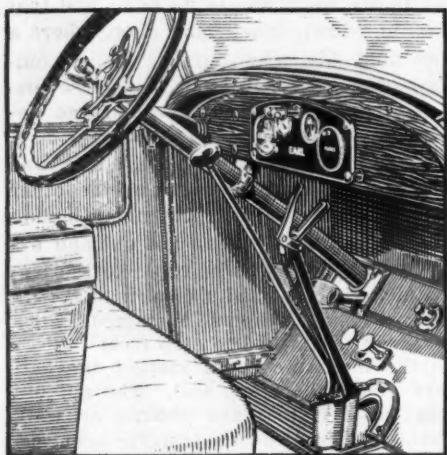
In spite of all that has been talked and written about courtesy, there still remains much to be accomplished along this line in the service station. Of some one hundred and fifty service stations visited recently, there was but one instance where one was asked to sit down while the work was being done, and that was in a lowly blacksmith shop, where a saw-dust fire was burning in an old-fashioned stove. In other places the customer is left to wander around and entertain himself as best he can.

In a town of 5,000 people a car was driven into a service station the other day. The car had as passengers a man and his wife. The man got out and explained as nearly as he could to the mechanic what seemed to be wrong with his engine. The woman remained seated, but soon was asked to step from the car so the mechanic could inspect the battery under the front seat. She got out and was left to stand around or walk about, as she pleased. It never occurred to anyone in the service station to invite her into the office to sit down. The place had no rest room, but surely a customer might be invited into the office or salesroom, which was vastly cleaner and pleasanter than her surroundings in the service station.

What we need in the automotive business—that is, the service end of it—is a better understanding of fundamentals and a "learning of the trade." The blacksmith said, "Any fellow can get a job in a garage and call himself a mechanic. They don't have to learn a trade, like we fellows did." Maybe he's right.

New Earl Longer and More Powerful Than Previous Briscoe

Practically the Entire Car Is Manufactured in the Jackson Plant—Necessary Parts Stock Reduced by Standardization of Right and Left, Permitting Use of Some Parts on Either Side



Dash and driver's compartment in new Earl 40

THE Briscoe Motor Corp. has been succeeded by Earl Motors, Inc., and the Earl car, a refined and larger edition of the previous Briscoe, is ready for delivery. The factory has recently been refinanced to manufacture on a minimum basis of 15,000 cars annually. Production at present, however, is not starting on a capacity schedule, although in a recent statement Pres. C. A. Earl said that plans are being made to double this minimum capacity and to aim for a 30,000 schedule in 1922.

The new car is longer and more powerful than the previous product. The wheelbase has been increased from 109 to 112 in., and the bore and stroke of the engine is now 3 7/16 by 5 1/4 as compared with 3 3/8 by 5 on the previous model. To accommodate the increased weight and length of the car, the tire size is now 32 by 4 in., non-skid, all around, in place of the 31 by 4 in., on the previous product.

In general characteristics, the car resembles the previous Briscoe, which was considered a successful design, incorporating a number of production features which rendered it unique. For instance, the car was noteworthy for the reduction in manufacturing expense, due to the standardization of drill sizes, taps, stampings and material specifications. As an example, only one design of spring

shackle is used. All spring bolts are of identical dimensions, and because the drive is taken through the springs, the load on the bolts at the front end of the rear springs is the greatest and determines the dimensions of all bolts.

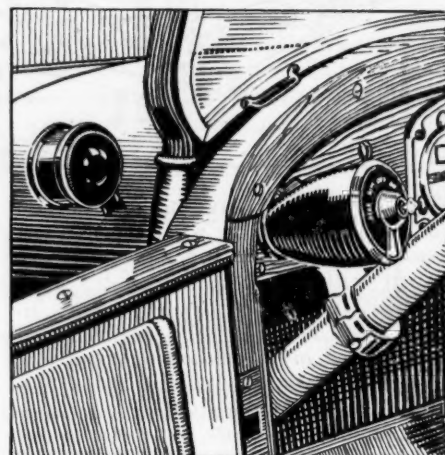
Another interesting feature was the elimination of right and left to an unusual degree. The use of identical parts for both sides of the car saved considerable expense in purchasing and reduced the inventory materially. The spring hobs, spring brackets, front fender irons, brake pedal forgings, propeller shaft, front and rear ends, and all the step brackets are identical.

In tooling the factory, the number of drill sizes has been also materially reduced. For instance, the oil return holes of the valve chamber are made the same size as the base hole of the crankcase top, and both are drilled by the same drill in the same operation. Practically all of the inspection gages have a large, specially milled face on their handles to designate the various uses for which the same gage can be employed.

Practically the entire Earl car is manufactured in the Jackson plant, which makes its own engine, transmission gear-set, steering gear, front and rear axles. The engine is a four-cylinder, block cast, L-head type with detachable cylinder head, three-bearing crankshaft and four-point flexible suspension. This suspension is designed to hold the engine rigid against the torque reaction, but to allow the frame to twist.

The pistons are cast iron, three-ring type, with two rings above the wrist pin and one below. The wrist pin is clamped at the end of the connecting rods. The two-inch crankshaft is supported in three bronze-backed, babbitt-lined bearings. The end thrust on the crankshaft is taken up on the center bearing by means of flanges at this point. The end play of the crankshaft is limited between .002 and .004 in. The crankshaft is in inherent balance and the counter-weighted shaft employed in the former model has been discontinued. On the former model, the counter-weights were bolted in place.

The timing gears are of the spiral type, one inch wide with steel crankshaft and generator gears and fabroil camshaft gear with a cast iron center. The valves are all on the left side of the engine and



Location of the ignition and lighting switch on the steering column. Note parking light on cowl

are actuated by mushroom followers. They have a clear diameter of 1 1/8 in. and a lift of 5/16 in.

Lubrication is by a low pressure force speed and splash type. The oil is forced from a plunger pump operated by the camshaft, directly to the oil pockets over the three main bearings; and connecting rod trough and connecting rods, as well as the cylinders, camshaft bearings, cams and valves are lubricated by splash. The pressure oil gage is on the dash and at normal speed indicates a working pressure of from two to four pounds.

Cooling is by thermo-syphon system. The hose connections are two inches in diameter for clear circulation, and the water jacket in the cylinder is brought below the bottom position of the piston and all around the valve seats. The capacity of the cooling system is five gallons. The location of the radiator relative to the engine is such that the combustion chamber is just on the level of the radiator. This arrangement is designed to keep the hot water in the top tank of the radiator and the upper half of the radiator core, and the cooler water in the engine.

The fuel is fed from the gasoline tank in the rear and by vacuum to the Scoe one-inch carburetor. This is a variable venturi type in which the venturi opening on the carburetor is arranged to adjust itself automatically to the load requirements of the engine, thereby maintaining constant air velocity at all engine

speeds. The electrical equipment of the car comprises a two-unit Auto-Lite starting and lighting system in connection with Connecticut battery ignition.

The propulsion system consists of a Borg & Beck 10-in. dry plate clutch, three-speed unit powerplant type of gearset, and tubular propeller shaft. There are two flexible disk types of universal joints and the entire drive is laid out to give a straight line propulsion with a maximum angularity of five degrees. A feature which keeps the tubular propeller shaft concentric with the gearset and the rear axle at all times is a special universal ball centering device, which allows fore and aft movement of the rear axle, but no eccentric movement of the propeller shaft. This device is intended to remove whipping strains from the transmission gearset and drive pinion bearings, and also to relieve the universals of some of the usual stresses.

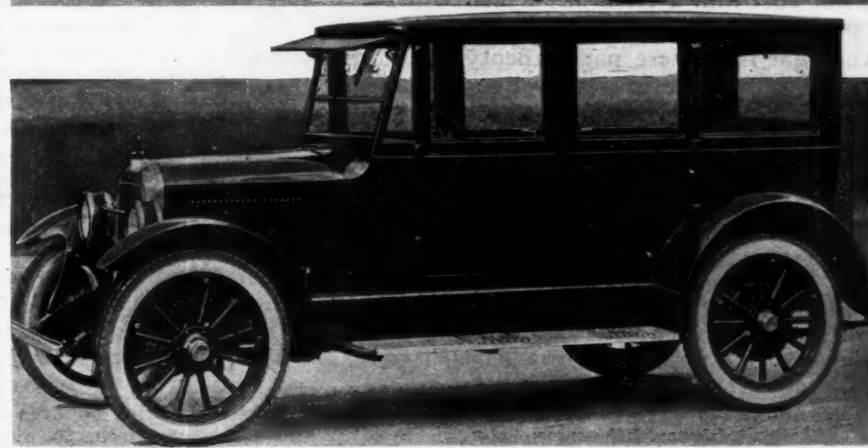
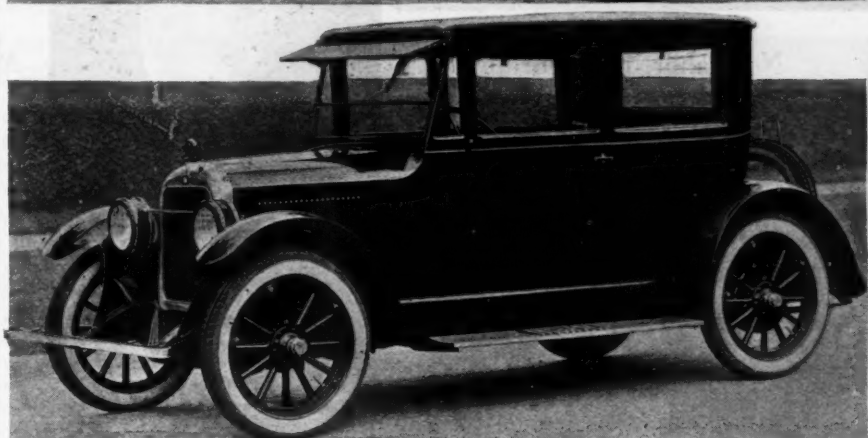
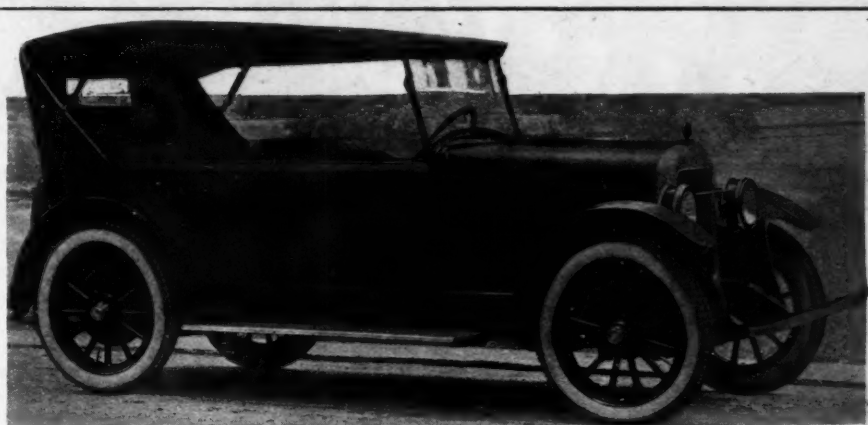
The frame is a single drop type with seven-inch side bars braced with five cross-members and two gusset plates. The rear springs are 56 in. in length and the front springs 36 in. All are semi-elliptic. The front wheels are mounted on Timken roller bearings and the front axle is of the drop I-beam type. The steering gear is worm and gear type mounted on ball bearings provided with adjustment features. The chassis is lubricated by the Alemite system.

IGNITION SWITCH WITHIN FINGER REACH OF STEERING WHEEL

In the trimming and fitting work, particular care has been employed to bring the new model thoroughly up to date. The windshield, for instance, is the new one-piece ventilating type with 38 in. wide glass. It is leak-proof in rainy weather, this having been accomplished by fitting over the cowl immediately under the windshield a molded rubber weather strip to give a rain-tight joint. The top of the open car is provided with a low, clear vision light with French bevel plate glass. The seats are low to the ground, although still the usual height above the floorboards. This has been accomplished by dropping the floorboards below the top of the frame.

An interesting feature, which is found on all models, is the design of the ignition switch. It is mounted on the instrument board at the left of the steering column in a separate case within finger reach from the steering wheel. This makes it possible for the driver to control all of the lights on the car with the left hand, leaving the right hand to handle the steering wheel and center control. The headlamps are the new drum type and sidelights are provided for parking. A rear view mirror above the windshield, an adjustable sun visor, and car heater are included in the equipment for the closed models. The door windows on the closed cars are operated by the new Dura crank type regulator and the interior hardware is of oxidized silver finish with a blue enameled design. The road weight of the touring car without passengers is 2550 and of the sedan 2800 lbs. Prices are as follows:

Four Body Offerings Comprising the Earl Line



Top to bottom—Earl touring car mounted on model 40 chassis. New brougham which has been added to the line on model 40 chassis. Distinctive roadster mounted on model 40 chassis. This has a step in place of running board, and the one-piece windshield and sloping rear deck gives a very up-to-date appearance. Earl model 40 sedan

Touring car	\$1,285	Roadster	\$1,375
Sedan	\$1,995	Panel delivery	\$1,160
Brougham	\$1,995	Screen delivery	\$1,085



No Labor Problem in This

One of the annual banquets the Price Auto Service Co., Wichita, gives to its employees. Mr. Price is shown at the right. He attributes the success of his company to the remarkable organization spirit that has been engendered through the



Automotive Service Family

policy of taking a personal interest in the welfare of his men. Mr. Price has found that the better he treats his men, the better service they render customers, and the consequent increase in business.

Sincere Interest in Employee's Welfare Pays a Big Dividend Here

How Three Automobile Concerns, by Golden Rule Policy of Dealing with Labor, Have Proven It Sound Business Judgment to Consider Interests of Their Men

WHERE the employer honestly interests himself in the affairs of his employees there is seldom any serious labor problem.

The employer himself has the power to do away with unrest in his employees by a few simple devices which will not cost him a cent, but which will be "money in his pocket" in the long run.

And that isn't mere paper theory. It's the dyed-in-the-wool experience of a very live automobile man at Wichita, Kan., who has taught automobile men in Wichita and elsewhere in that state a few things they didn't know or didn't practice.

And another big dealer in Wichita has achieved striking success in the same manner.

The men are Will G. Price, president of the Kansas Automobile Trade Association, and president of the Price Auto Service Co., authorized Ford agency; and O. J. Watson, president of the O. J. Watson Motor Co., factory distributor for Overland and Willys-Knight motor cars, Republic trucks and Fordson tractors.

While others have preached about "man's inhumanity to man" and the inherent differences between employer and employee, and have suggested numerous highly technical or fanciful ways and means of getting more work and more money out of employees, Price and Watson, each working independently but along the same general idea, have gone ahead, and achieved wonders in their businesses.

In Wichita, Price's policy has proved an unqualified success in the handling of his employees. And Price declares it is a policy which, if universally adopted, would help cure the labor ills prevalent in the commercial world.

And here's something, too—In the last four years Price's business has increased surprisingly.

For the employer the policy has resulted in:

No strikes.

No dissatisfaction among employees.

More work per hour from each man than is obtained by other employers.

A constant stream of applications for jobs from men in the employ of other companies.

An unprecedented growth in business.

The employee has profited by:

A weekly bonus of \$2.50 until the cost of living be materially reduced.

A yearly bonus based on length of service in the Price plant.

A \$50 Liberty bond for each new addition to the family.

One afternoon off each week.

A liberal vacation plan.

And a fine spirit of cooperation exists between the plant head and every single member of his establishment, resulting, it is said, in great benefit for both owner and workers.

Price believes in keeping his promises. Of the fifteen men who went to war from his establishment, every one was hired, and the time they spent for their country counted in the yearly bonus allowance.

Each summer Price shuts up shop for one day and takes his employees out for a picnic. There he mingles with his men as with his family, and his children and those of his employees play in the sand and make mud pies together.

"We really are a big family," is Price's explanation, "and my men are made to feel that we are actually on the same footing, without any dilly-dallying about it. By promoting a

democratic spirit, the men take a personal interest in the business and its welfare."

Each Christmas the employes of the shop are guests of Price at a banquet, where the yearly bonuses are given, and the new arrivals in the "family" draw their bonds.

Two motives are assigned by Mr. Price for his attitude toward his employes, one philanthropic in its principles, and the other, he says, more or less selfish.

"I have made my money and a success of my business solely because of the loyalty of my employes," he says, "and it is only just that they should share in the profits. Then, too, the better I treat my men, and the more I impress upon them that I have a personal interest in their welfare, the better service they will render my customers, with a consequent increase in business. The policy I have adopted with my help works for their prosperity and mine as well."

Has Price's policy paid?

Five years ago, when Prince started in business, he had a one-story building, 25 by 100 ft., and employed one man. Today he occupies a building 14 times the size of the first one, and has nearly 100 persons in his employ. He maintains a \$100,000 stock of parts, and gives a one-day service in rebor-ing and rolling cylinders and in repairing radiators.

"I am able to give the best of service to my customers because of the workmanship in my shop," Price declares. "And I am able to obtain that class of workmanship because of the Golden Rule as applied to those in my employ."

"Not only has the application of the Golden Rule helped me increase my business in the last five years, but it has given me a feeling of satisfaction and happiness I never had before. I want to build a business that my sons will be proud to inherit. I believe that I am doing so by democratic treatment of my men."

Price really wants his men to feel they are his social equals in every respect. That his wishes in this line have been fulfilled is evidenced when one walks with him through the shop. It's "Hello, George," or "How's she working today, Jim?" with a smile for each—and naturally a grin in return. And his men do not dread a "visit from the boss." Each one knows Price realizes they are doing the best they can to repay him for his consideration, and the men are always glad to have him about the shop.

Mr. Price prides himself on the fact that he not only knows each man in his employ by his first name, but is on intimate speaking terms with every member of each man's family.

As a part of his plan of "social equality" there is the annual Christmas banquet. But in previous years, when the men and their families were assembled for their annual banquet, he had noticed that some of them were rather ill at ease in the surroundings provided them. They did not seem to "loosen up."

The one thing that Price wanted was to have his men at ease—to catch an informal spirit and have a rousing good time as they would if at their own tables at home.

So he devised a scheme which accomplished the result. Before serving the dinner each man was instructed to open a spark plug carton at his plate. Investigation disclosed the yearly bonus of each man. Then the men picked up the menu which had been ingenuously arranged by Price as follows:

Anti-freeze Solution	
Band Linings	Heinze Starters
Cork Gaskets	Lamp Thimbles
Meet at Price's	
Com-u-tators	Shorted Looms
Defective Pedals	
Timken Bearings and Cup Grease	Special Assembly
Frozen Radiator	Lava
Re-nu	
Exhaust Pipes	

The men became intensely interested in translating these unusual titles into ordinary menu dishes. The names they used in their daily work added to the pleasure, and soon they had lost all formality and were laughing and chatting with freedom.

As for Price—well, his men were enjoying themselves to the limit. His object had been achieved.

"The greatest Christmas I ever had," he declared.

Mr. Price believes he has adopted the only policy which will help settle the labor question.

"What I have done," he says, "other employers certainly

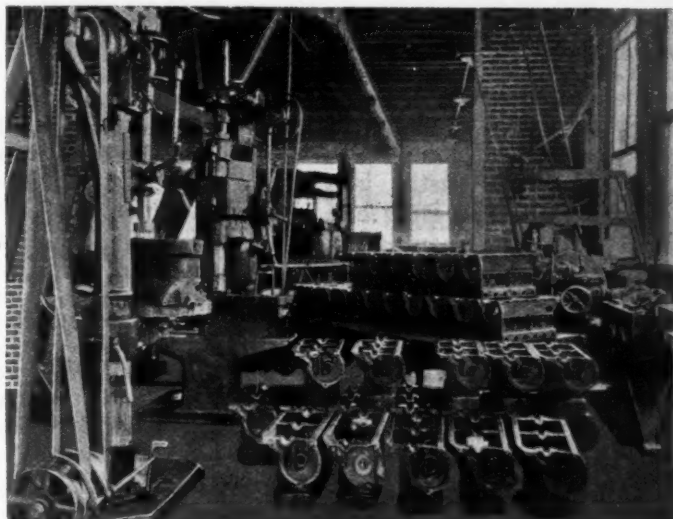
can. If I were a laborer today, I, too, probably would be among the ranks of the dissatisfied. I would be wondering whether my employer ever gave me a thought, personally—whether he ever cared for anything other than the obtaining of more wealth for his personal use.

"It is easy to get the habit of being considerate for those whose work is building a business. Upon them falls the brunt of the hard knocks. I, too, as all employers, have my troubles. But my men have been taught that an employer has his problems—and they are always ready to do their best to see that I come out all right."

"Consideration of one's employes pays—first, in satisfaction to the 'boss' and, second, in an irresistible increase in the number of satisfied customers."

HOW WATSON BUILT HIS BUSINESS

As for O. J. Watson, now rated as one of the largest automobile, truck and tractor distributors in the southwest, he only a few years ago was a young man, breaking Texas sod with a plodding ox team. Today he occupies in entirety a new, five-



This gives an idea of the volume of cylinder regrinding work done by the Price Auto Service Co., Wichita. No small part of the jobs is here as a result of this company's labor policy. Good work follows satisfied employes, and customers appreciate this fact.

story brick and concrete building, one of the best buildings in Wichita, and his business is booming. He attributes it largely to his method in dealing with his men.

For instance—men who work with automobiles are always glad to have an attractive place where they can wash thoroughly, and consequently a complete bathing equipment has been placed on the repair floor.

Watson had his employes in mind when he planned his building to obtain north light, to save eyes and backs. He made it pleasant for his men to work for him.

AND ANOTHER INSTANCE OF EMPLOYER-EMPLOYEE COOPERATION

Another example of the fine spirit existing between employer and employe is furnished by the employers and employes at the Nagelvoort-Stearns Cadillac Co., distributors of Cadillac automobiles.

"We believe that the good will of our assistants is one of the best assets we have," Floris Nagelvoort said. "Each month we have an informal dinner with all our employes present. We give a dollar to each one who offers a suggestion for the benefit of the business, which is accepted."

Employes of the Nagelvoort-Stearns Cadillac Co. met and formulated these interesting resolutions, submitted to the office on New Year's Day:

"Whereas, we fully realize that in order to attain the best out of our respective positions and to establish relations on a definite and durable basis of confidence and respect, so that by mutual understanding we may attain closer cooperation and efficiency in our chosen vocation, we hereby resolve:

(Continued on page 46)

Mechanical Features of the German Cars

SOME Remarkable Constructions — Because of the Low Value of the Mark, the Teutonic Automobiles Are the Cheapest on the World's Market, Despite the Fact That Production Is Not Considered a Major Problem

By W. F. Bradley

European Correspondent of MOTOR AGE.

Berlin, Sept. 27.
BERLIN'S automobile show, the first since 1911, marks the complete re-entry of the German automobile industry into world competition. The show was held in a big hall specially built by the German automobile manufacturers for exhibition purposes, and was finished just before the outbreak of war. At the same time, the German makers inaugurated their own speedway, the only one of its kind in Europe, having its main entrances a couple of hundred yards from the exhibition hall. This track undoubtedly served as an immense attraction to the show; it is estimated that on the opening and following day half a million persons paid for admission to the Speedway.

Undoubtedly business conditions at the show were satisfactory, and as a result of the exhibition, many factories have orders far ahead. Berlin is full of foreign buyers who are interested, among other things, in automobiles because of their low price by reason of the depreciated value of the mark. For the purposes of comparison, the value of the mark may be taken as being equal to one cent in American currency. Sometimes it gets a little above this figure, but more often it is below this amount. On this basis, the most costly car in the Berlin show is the Maybach 90 hp. six-cylinder, which with high grade open body and all modern fittings, is listed at \$4,300. A few other prices, selected haphazard, are as follows:

Mercedes, 6-cyl., 90 hp., open body.....	\$3,300
Benz, 6-cyl., 50 hp., open body.....	3,200
Opel, 6-cyl., 75 hp., open body.....	3,000
Horch, 6-cyl., 80 hp., open body.....	2,750
Rumpler, 6-cyl., 50 hp., open body.....	1,500
Rumpler, 6-cyl., 50 hp., sedan body.....	2,000
Adler, 4-cyl., 18 hp., open body.....	1,300
Adler, 4-cyl., 26 hp., open body.....	1,800
Dinos, 4-cyl., 30 hp., open body.....	1,600
Ego, 4-cyl., 20 hp., 2-seater, open body.....	710
Brennabor, 4-cyl., 25 hp., open body.....	700
Bob, 4-cyl., 20 hp., 2-seater.....	620

GERMANY HAS NOT YET LEARNED THE METHODS OF CHEAP QUANTITY PRODUCTION

THE majority of these are really high grade cars with excellent body work, comparable to the most costly types produced in America or elsewhere. The open six-cylinder Rumpler, for instance, is a car which would be sold in any other European country at twice the price asked on the Berlin market; considered as a whole, equivalent models built by Italian, French, Belgian or English firms would cost 50 to 75 per cent more in American currency. In all cases, these are retail selling prices in Berlin; for export business lower prices would prevail.

In the above list the only car really laid out for cheap production is the four-cylinder Brennabor, indicated as 25 hp. This power, in common with others quoted above, is really

the actual power of the engine, an equivalent rating in other European countries being 10 to 15 hp.

Germany is in a position to challenge the world with medium and high grade cars, which are cheaper than those of any other nation by reason of the depreciated value of the mark. There has been very little attempt as yet to get down to low prices by simplified design and cheap production methods, as they are known in America. One of the reasons for this is that the home market is very small, and the foreign market being varied, it is difficult to select one type which will be successful for a wide range of countries. Another reason is that Germany has not yet had time to learn the lessons of cheap production, and her engineers have preferred to continue on the same general lines as before the war.

The three companies best known on the world's market are Mercedes, Benz and Opel, all of which are purely automobile concerns, unconnected with other industries. Some of the others, although not so well known abroad, are linked up with very powerful combinations. N. A. G. forms a branch of the A. E. G. (German General Electric Co.), which in turn is allied in a certain measure with the American General Electric.

CAN COMPETE IN ALL FOREIGN COUNTRIES EXCEPT FRANCE, WHERE DUTY IS PROHIBITIVE

THE Protos Co. is a branch of the Siemens Electric concern, one of the biggest manufacturing and industrial organizations in Germany. The Dinos car is in the hands of Hugo Stinnes, probably the biggest manipulator of capital in Europe. Krupp, of gun fame, is also interested in automobile construction, but up to the present the factory has confined its attention to trucks and scooters.

While capable of competing on nearly all foreign markets, with the exception of France, where there is a prohibitive duty against former enemy countries, Germany is doubly protected in her own territory. Not only does the exchange rate make it impossible to import cars into Germany, but it is necessary at the present time to obtain a government permit to import, and this is not readily given. This state of affairs applies not only to automobiles, but to tires and all accessories. There is an opportunity, however, for American capital to interest itself in the German industry. This has been done by Goodrich, who has secured 50 per cent of the shares of the Continental Tire & Rubber Co. at Grandenz (now named Grudziacz) in West Poland, formerly Prussian territory. It is reported, although no confirmation of this has been obtained, that the Ford Motor Co. has secured a controlling interest in the Hansa-Lloyd Co. Among accessory firms, Klaxon and Zenith manufacture in Germany.

Forty-six passenger cars manufactured were represented at the Berlin show, these firms producing 90 models. Twenty factories build one type only; 15 produce two models, five have three models, five have four models, and one firm produces five types. A dozen of these firms are interested also

in automobile trucks. The 90 models represented at the show can be divided up as follows as regards horsepower:

Models with engines of about 14 hp.....	5
Models with engines of about 15 hp.....	3
Models with engines of about 18 hp.....	11
Models with engines of about 24 hp.....	13
Models with engines of about 25 hp.....	4
Models with engines of about 30 hp.....	18
Models with engines of about 40 hp.....	3
Models with engines of about 45 hp.....	13
Models with engines of about 50 hp.....	3
Models with engines of about 55 hp.....	7
Models with engines of about 75 hp. and more.....	4

The bore-stroke ratios and the engine revolutions are given in the following table, which indicates the minimum and the maximum:

Brake hp.	Bore-stroke ratio	R.P.M.
14	1.1 —1.5	1800—2400
15	1.3 —1.55	1600—2500
18	1.25—1.8	1800—2600
24	1.25—1.8	1500—2600
26	1.3 —1.9	1400—2200
30	1.35—2.1	1400—2200
40	1.35—1.7	1600—2200
45	1.3 —1.7	1400—2000
50	1.3 —1.6	1400—2000
55	1.4 —1.45	1400—2200
75	1.1 —1.5	1400—1600

The four-cylinder engine is in a huge majority, representing 80 per cent of the German automobiles. Six-cylinder engines represent 16.6 per cent, eight-cylinders are 1.13 per cent, and twins and singles are each 1.13 per cent. Germany has not been carried away with the multi-cylinder idea, for there is only one eight-cylinder in the show, this being the Apollo V-type. There is also only one single-cylinder, a two-stroke air-cooled, used in a cycle car.

Vertical cylinders are used on 96.6 per cent of the engines; the W-type is used on the Rumpier six-cylinder, and represents 1.13 per cent of the whole; the V-type is also in the proportion of 1.13 per cent, as applied to the Apollo eight, and the horizontal opposed is 1.13 per cent.

Four-cylinder engines are in one casting in 83.2 per cent of the models, and pairs in 16.8 per cent. For six-cylinder engines, block casting is found on 33.3 per cent, pairs in 40 per cent, and threes on 26.7 per cent. In the great majority of cases cylinders are gray iron casting. Mercedes is using steel cylinders for all poppet valve models. There is an increased number of aluminum cylinders with steel liners, most of these having cylinders and crankcase in one casting, detachable heads and overhead valves. Examples are Dinos, Audi, B. M. W., Swave, and Horch. Detachable heads represent only 11 per cent of the whole, while aluminum pistons are used on 42.2 per cent of all models.

The L-head engine is at the top of the list with 67.7 per cent, followed by the overhead valve type with 21.1 per cent. L-head engines with inclined valves are 3.3 per cent. The Knight engine is used by Mercedes, the proportion being 2.2 per cent. There are no other substitutes for the poppet valve. One valve in the head and one operated from below is found on 4.4 per cent of the cars.

ZENITH AND PALLAS CARBURETERS FITTED TO THE MAJORITY OF CARS

ON four-cylinder engines, the crankshaft bearings are as follows: two plain bearings, 5.5 per cent; three plain, 76.4 per cent; four plain, 4.4 per cent (Dinos car); two ball bearings, 6.9 per cent; three ball bearings, 2.7 per cent; four ball bearings, 1.3 per cent; five ball bearings, 2.7 per cent. On six-cylinder engines the proportions are two plain bearings, 6.7 per cent; three plain, 6.7 per cent; four plain, 66.6 per cent; seven plain, 20 per cent. Ball bearing shafts are not used for six-cylinder engines. The front end drive is by spur pinions on 27.7 per cent of the engines; spiral bevels are used on 21.1 per cent, and chain drive on 43.3 per cent. Bevel gear drive for overhead camshaft is used on 7.9 per cent of the engines.

Cooling is about equally divided between thermo-syphon and pump circulation, the former representing 47.7 per cent and the latter 48.8 per cent. Air-cooling represents 3.5 per cent. Fan designs are as follows:

Aluminum, 2 blade.....	14.9 per cent
Aluminum, 3 blade.....	33.3 per cent
Aluminum, 4 blade.....	11.4 per cent
Aluminum, 6 blade.....	2.4 per cent
Steel sheet, 2 blade.....	14.6 per cent

Steel sheet, 3 blade.....	18.4 per cent
Steel sheet, 4 blade.....	4.8 per cent
Flywheel fan.....	4.8 per cent

Radiator cores are 83.9 per cent tubular and 16.1 per cent honeycomb type. Pointed radiators are found on 92.2 per cent of the cars, half round on 2.3 per cent, and flat on 5.5 per cent of the cars. Materials used for the radiator shell are: brass, 93.1 per cent; German silver, 2.2 per cent; copper, 3.4 per cent, and aluminum, 1.2 per cent.

The full pressure lubricating system holds the field with 74.4 per cent; combined splash and pressure is 17.7 per cent; splash system, 3.5 per cent, and Bosch oiling system, 4.4 per cent. Gear type oil pumps are 63.9 per cent of the whole; eccentric pumps, 16.3 per cent; plunger pumps, 19.8 per cent.

In the carbureter field Zenith has a proportion of 38.8 per cent; Pallas, 41.1 per cent; other makes, 15.7 per cent, and car makers' own carbureters are 14.4 per cent. Carbureter control is 1.2 per cent by hand only, 8.7 by accelerator pedal only and 90 per cent with both. The gasoline tank is at the rear on 78.3 per cent of the cars, on the dash on 21.6 per cent, and below the driver's seat on 1.1 per cent. Fuel feeds are 11.1 per cent exhaust pressure, 22.3 per cent air pressure, 45.5 per cent vacuum and 21.1 per cent gravity.

Ignition by single magneto is 90.3 per cent; double ignition is 6.6 per cent, and battery-dynamo 2.2 per cent. Bosch equips 80 per cent of the cars with magnetos. Spark control is by hand lever on 72.2 per cent of the cars, fixed on 8.8 per cent, and automatic on 20 per cent. N. A. G. has a combination of hand lever and automatic control. Electric lighting is used on 94.5 per cent of the cars, practically all of these being Bosch, and acetylene on 5.5 per cent. Electric starting is 67.7 per cent, and cars without starter 32.3 per cent. Battery boxes are mounted on the running board of 60.1 per cent of the cars, inside the frame on 30.1 per cent, and below driver's seat on 9.4 per cent.

TRANSMISSIONS WITH FOUR SPEEDS AHEAD ON 83.4 PER CENT OF GERMAN CARS

THE clutch systems are 48.2 per cent leather cone, 16.6 per cent Ferodo cone, 4.4 per cent double cone, 5.5 per cent metal cone, 14.4 per cent steel disks, 7.7 per cent brass and steel disks, 3.3 per cent dry disks, 4.4 per cent three plate, 1.1 per cent extension clutches, and 4.4 per cent reversed cone. A clutch stop is fitted on 58.8 per cent of the cars.

Unit construction of engine and transmission is 21.1 per cent; engine and transmission separate is 75.6 per cent, and transmission on rear axle 1.1 per cent. Rumpier has engine and transmission forming a block mounted at the rear, the percentage being 2.2. Four speeds ahead represent 83.4 per cent; three-speed transmission, 14.4 per cent; two speeds, 1.1 per cent, and a single speed, 1.1 per cent. This latter is the Maybach so-called transmissionless car.

Spiral bevel gears for the final drive are 39 per cent; straight bevels, 58.6 per cent; worm gear, 2.4 per cent. Differentials are nearly all bevel type, only four cars having spur gear differentials.

Wood wheels hold the premier position with 40 per cent; wire wheels, 27.7 per cent; steel disk wheels, 11.1 per cent; steel spoke wheels, 18 per cent. Detachable wheels are 43.2 per cent; detachable rims, 58.3 per cent; fixed wheels and rims are 4.5 per cent. All rims are clincher bead type. Front axles are 37.5 per cent open jaw type and 62.5 per cent closed jaw.

Front springs are 91.2 per cent half-elliptic; 3.3 per cent cantilever (Rumpier car); 3.3 per cent transverse, and 2.2 per cent quarter-elliptic. At the rear 62.1 per cent are half-elliptic; 24.4 per cent cantilever; 6.6 per cent three-quarter elliptic; 2.2 per cent transverse; 1.1 quarter-elliptic; 1.1 per cent spiral, and 2.5 per cent other systems.

Right-hand steering and right-hand control represents 89.4 per cent; left-hand steering with center control is 6.7 per cent, and right-hand steering with center control, 3.6 per cent. Steering gear is worm and sector on 43.3 per cent; screw and nut on 55.5 per cent, and other types, 1.1 per cent.

Front wheel brakes have only just made their appearance in Germany, being found only on 2.2 per cent of the cars. Foot brake on the transmission is 91.2 per cent, and on rear wheels 8.8 per cent; hand operated brake on rear wheels is 97.8 per cent; 57 per cent of transmission brakes are external

and 33 per cent internal. Only 3.6 per cent of these are water-cooled. The percentage of external rear brakes is 4.4. Brake equalizers are 82.2 per cent by balance lever, 14.4 per cent by cable, and 3.3 per cent by bevel gears.

The following chassis weights, without fuel and oil, show wide ranges of difference. In each case the lightest and the heaviest chassis has been taken.

Engine hp.	Weight in pounds	
14.....	840	1,100
15.....	925	1,230
18.....	1,150	1,870
24.....	1,655	2,095
30.....	1,985	2,910
45.....	2,115	3,085
55.....	2,645	3,750
75 and more.....	.....	about 3,970

Considered as a whole, German manufacturers have specialized in a good quality medium car. There has been no attempt to compete with the cheapest American types, and the Germans have avoided the French mistake of two years ago of producing mechanical masterpieces irrespective of price.

Since pre-war days there has been a wonderful cleaning up of the details of engine and chassis. External oil pipes, straggling ignition leads, external manifolds, visible bolt heads, etc., have been removed, some of the best German constructions now approaching the clean lines for which Italian chassis are famous.

Overhead valve engines and aluminum cylinders with steel liners are not in a majority, but it is evident that German engineers are working along these lines. There are some really good examples in this connection.

MAGNETO USED ON ALL DESIGNS WITH THE EXCEPTION OF TWO OR THREE

ONE good example is the power plant built in Munich by the Bayerisch Motoren Werke for car assemblers. This firm made a reputation during the war on aviation engines, and since then has specialized on automobile engines. Its latest type is designated a compound motor, and has cylinders and base chamber in one aluminum casting, steel liners for the cylinders, a detachable cast iron head, and four valves per cylinder inclined in the head. This being a sporting type engine, double ignition is fitted, with two magnetos driven off a cross-shaft at the front.

A reserve oil tank is cast in the housing around the flywheel. This engine being a high efficiency type of 95 to 170 mm. bore and stroke, with five-bearing balanced crankshaft, it is intended to put it on the market with a two-speed transmission.

N. A. G. has a cheaper production job with detachable head, cast iron cylinders, on an aluminum base chamber, and overhead valves with push rods concealed in the cylinder casing. The design is not costly and the general layout equal to that

of the best to be found elsewhere. One of the features of this chassis is the direct mounting of the separate gearbox on a stiffened mud pan, instead of on a sub-frame or to the main frame members. All-aluminum engines have even made their appearance for trucks, the best example being the Hille, produced in Dresden. This has aluminum cast cylinders with detachable cast iron head and overhead valves.

Generator-battery ignition has not made its presence felt in Germany, for with the exception of the Dinos, controlled by Hugo Stinnes, and one or two others, the magneto is used everywhere.

The open body dominates in Germany, with the sedan following a long way in the rear. German body designers have developed distinctly Teutonic lines. Invariably radiators are pointed, and the top is always concealed. All bodies are bright colored. Very frequently the top of the hood and a deep line running around the body and taking in the top housing is in a dark color with the rest of the body in a lighter tint of the same color.

FANTASTIC DESIGNS IN PANELLING AND ECCENTRIC BODY WORK ATTRACT NOTE

THERE are infinite variations on these general lines, but there are no exceptions to this general type. There is a great love for beaten metal radiator shells, and even engine hoods, many of these imitating beaten bronze.

Fantastic designs in panelling are very common, and it would almost seem as if the body designers had sought to make automobiles which would attract attention by reason of their eccentricity. As an example, there is an all aluminum body with etched designs on it. In itself the typical German line is not displeasing, but when it is accentuated by strong contrast in panels, by abrupt angles in the fenders, and by startling colors, the result is often hideous—at any rate, to anyone trained to body lines as developed in all other countries of the world.

For passenger cars, only clincher bead fabric tires are used. The Continental detachable rim is very extensively used, being seen more often than the detachable wheel.

By reason of American participation in the Continental Rubber Co., giant straight side cord tires have made their appearance on the German market, and are being used for trucks and passenger-carrying sightseeing automobiles. This is an important development for Germany which, during the war, was totally deprived of rubber and a year ago had not seen a giant pneumatic tire or had any experience with straight sides. The new tire is being used on three to five-ton trucks, both as singles and as duals.

In an article to be printed later, Bradley will describe some German cars of original design.

The Use of High Speed Hoists in Service Stations

THE use of chain hoists in automobile repairshops, or garages, is, of course, a necessity, but the proper selection of a hoist as to type involves an understanding of principles frequently overlooked.

In these repairshops both the differential pulley block and the high-speed hoist are found. The differential pulley block, being the first to find its way into them and costing but one-third as much as its modern rival, is still extensively used.

In addition to price, two other factors must be duly considered when a new hoist is to be installed. These are speed, or the number of feet of hand chain that must be overhauled to raise the load to a given distance and force, or the pull in pounds required on the hand chain to raise the weight.

As ordinarily made, the number of

feet of hand chain that must be overhauled to lift a given load is about the same with both hoists. And, as the differential pulley block is the cheaper hoist, it evidently is to the question of force, or the effort exerted on the hand chain, to which we must look to establish the superiority of high-speed hoists.

Less Effort with Speed Hoist

Here are the facts. With a ½-ton high-speed hoist, a pull of 60 lbs. only must be exerted as against a pull of 120 lbs. with the differential pulley block; with the 1-ton high-speed hoist, a pull of 80 lbs. only must be exerted as against a pull of 218 lbs. with the differential block; and with the 2-ton high-speed hoist a pull of 120 lbs. is exerted as against 306 lbs. with the pulley block.

Thus, it is evident, the problem reduces itself to one of labor versus price.

From two to three times as much effort must be exerted to lift a load with the differential pulley block as with the high-speed hoist.

Is the difference in price sufficient to warrant the expenditure of this wasted man power, for this energy is actually wasted, being consumed in overcoming the friction of the machine?

Even in those cases where very light loads only are lifted and when the hoist is used but occasionally, the saving in man power is sufficient to warrant the use of the high-speed hoist over the cheaper differential pulley block.

In practically all cases, and especially in automobile repairshops, the high-speed hoist is by far the cheapest to use from the fact that it prevents the unnecessary waste of human effort, the most expensive of any kind of power it is possible to buy.

A Dealer Organized Safety Bureau

TRAFFIC dangers constitute one of the increasing sales resistants. Dealers can go into a reasonable project to lessen traffic dangers with a completely selfish motive and yet feel assured that they are doing a great humanitarian work.

This speech by Robert E. Lee, manager of the Automobile Manufacturers' and Dealers' Association of St. Louis, tells of the effective work accomplished by a Vigilante movement in that city where it is connected with the National Safety Council work. In his remarks, Lee did not explain the origin of this movement. It was a creation of the Association which he represents, but the members of the force spoken of include men in all walks of life.

It is, of course, necessary to have a man at the head of this force of private policemen who will accept the responsibilities and criticism of the movement.

In this case, Lee filled this place by sacrificing his personal feelings and undertaking the task. There may be a suggestion in this for dealers in other cities who are seeing sales difficulties in traffic conditions.

By Robert E. Lee*

THE experience St. Louis has had with the work of a Traffic Vigilante Committee has been more than satisfactory—it has been distinctly profitable from the standpoint of safety. The slogan of the Vigilantes of St. Louis is, "Make St. Louis the Safest City in the World to Live In."

At this time our organization consists of about 325 Vigilantes and the only publicity known one of them is the "Chief Vigilante," who is the speaker. We have maintained this secrecy about our organization for several reasons, the best of which is that there is a marked phase of psychology in holding out to the general public, particularly the motoring public, the thought that there are a great number of keen-eyed, determined men watching to see that the law is not violated and watching at the time when the uniformed policeman is not around.

It is a patent fact that a man will not drive past a street car when it is unloading passengers if there is a uniformed policeman close at hand, but the same man would try to sneak by if he did not fear that the motor car behind him had in it one of those Argus-eyed Vigilantes. If that Vigilante carried some visible mark of identification on his car, or person, he would be as conspicuous to the law violator as a policeman. We feel that it is the secrecy of our work that makes it most effective.

Our plan of procedure is simplicity itself. If a Vigilante sees a traffic violation, he notes the license number of the offender. On one of the blank post cards which he carries in his pocket, he checks the particular offense committed (the post card indicates about twenty), signs his Vigilante number, filling in the time and the place of the occurrence and this card is mailed to the Chief of Police of St. Louis.

At the office of the Chief of Police, the Safety Council's Vigilante Division main-

tains a stenographer, a clever young woman who knows in most instances what to do. All of these post cards are turned over to her each morning and she sends a notice to the offender, telling him what and where and when his offense was and instructing him to make a written explanation thereof to the Chief of Police. In case of a very flagrant or major offense, the offender is given pre-emptory orders to report in person to the Chief of Police to make explanation as to why he violated the law.

We find by this method that we secure the good will of the police department because the report of our work is published each week in the Police Journal, which reaches every policeman, and we find that it is felt that the Vigilantes are really an auxiliary policeman who must be considered at all times and helped. The Board of Police Commissioners of the city is warmly and strongly in approval of our work and renders every possible assistance, and the Chief of Police gives his heartiest support to us

*An address delivered before the Public Safety Section of the National Safety Council at the Tenth Annual Congress.

and his hardest third degree to the offender who comes by invitation to see him.

Our Vigilantes have been very active. There have been weeks when they have turned in as many as 2000 reports of violations. That was when a special drive was on. The normal number of reports a week is 600. These cover practically every item of traffic law violations, including no lights and one light, but our best attention as Vigilantes is given to the major offenses, such as reckless driving, passing street cars when loading, passing corners at high speed, and other offenses of a dangerous character.

We have been very careful in the selection of our Vigilantes, our care arising from the fact that we made a few mistakes in the beginning. Our appointments of very young men have not been satisfactory, because they used the badge which was furnished them either to intimidate, to get out of trouble themselves, or to "play smart."

Our personnel now consists of men ranging from 30 to 50 years, and all of them are men of excellent standing in the community, many being heads of large businesses. I find that the bigger the man is in the business world, the more anxious he is to help make his city the safest in the world to live in.

Our total experience up to this time with the Vigilantes as an important branch of Safety Council work has been highly satisfactory and we would not recede from it nor drop it. In addition to the fact that it keeps down tremendously the number of street accidents and casualties, it has a marked advantage to the local Safety Council itself, in that it frequently furnishes opportunities for good newspaper publicity which do not arise from the more prosaic safety work done in industrial plants or schools.



Traffic Vigilantes Committee in St. Louis help make city safe

Minimizing Cost of Printing Jobber's Catalog By Using a Loose-Leaf Book

*And Some of the Other Advantages That Have
Resulted from the Flexibility of This Type of Binding—
New Pages Sent to Replace Those Obsolete*

THE inflexibility of the conventional automotive equipment catalog printed by jobbers, and the almost prohibitive cost of supplying complete new issues frequently enough to care for price changes and new items, decided the O. D. Tucker IV & Co., Little Rock, Ark., to plan a new type of catalog which would eliminate or minimize these objectionable features.

The solution of this problem seemed to lie in a loose-leaf catalog, for which revised pages could be sent to replace those made obsolete by changes. This being decided, the next step was to evolve a loose-leaf book at a price that would make it practical.

To the knowledge of the organization there were no firms that had ever made up a big loose-leaf catalog of 300 pages, and apparently there were no inexpensive binders on the market that would successfully hold this number of pages. After experimenting with several straight post binders and finding them too expensive and also too extravagant of paper, it was concluded a back with flexible posts was necessary.

An investigation showed that the flexible post binders on the market were too costly to come within the outlay of funds at their disposal for this work, so a trial was given several similar binders more economical to manufacture. A post made of wire and tin was finally found, which compared favorably with the stitched back books.

Next was the question of a serviceable and attractive cover that would come within the price limits. Good cover stock at a reasonable price was readily found, as was an artist who could design an attractive cover.

A real problem then presented itself in finding a binding back between the two covers which would be flexible and permit the addition of new pages as the line grew. The book, originally about one-half inch thick, would grow to over one inch in thickness in time.

Their first plan was to supply several thicknesses of binding, but because the

Cutting Catalog Costs

THAT'S an interesting subject to the jobber and that makes this an interesting article to him. Mr. O. D. Tucker of O. D. Tucker IV & Co., jobbers in Little Rock, Ark., has been in this business for nine years and has made a study of his catalog costs. He finally decided that the loose-leaf book was the solution of the problem of a new catalog each season, or oftener, to keep his line up-to-date. Read this article to see how he met some of the difficulties of printing at a reasonable cost, and how the loose-leaf book is saving him money.

cover soon becomes soiled from its continual handling, and the substitution of a new clean binding back whenever the book changed in thickness would make an unattractive contrast, it was discarded for a corrugated binding back which would expand as the catalog grew.

After having been able to get the cover, stock and the paper cut and punched at a price that made this new venture look very promising of a big saving, the printers' union rules would not permit the Tucker people to print the sheets in accordance with the plan evolved.

They wanted the pages set-up and the complete set-up sold to them outright, so that when additional sheets were needed the only expense would be for labor and paper. The printers' union rules in their city specified, however,

that when set up in one shop and used in another, the set-up is again charged to the job. This would have made the cost of their catalog impossibly high, involving a losing investment.

The only solution of this problem seemed to be the purchase of a printing press. They ordered one to be shipped in sixty days, and after waiting a year for delivery, finally received it. If a union printer were hired to operate this outfit it would be necessary to hire a feeder, a pressman and a binder to do what was actually a one-man job, so they decided to use one of their employees to operate the press.

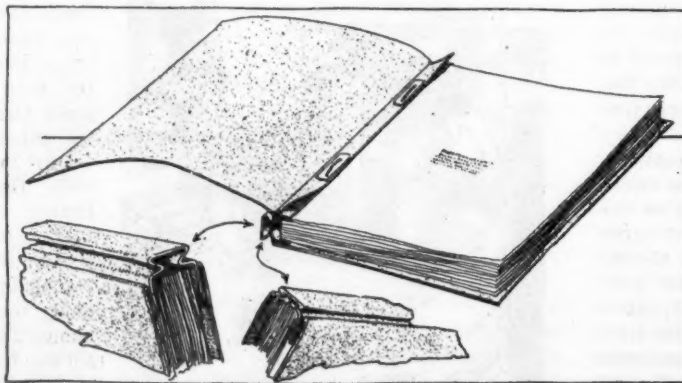
With the printing press, binders, paper stock, cuts and descriptive matter in hand, 750 catalogs were soon turned out at a cost for equipment, labor and material of less than \$2,000. They purchased the complete set-up from the printer and have enough stock and backs for 1250 more books.

The catalog is made up of three sections. The first section includes a page of explanation and pictures and descriptions of the equipment sold, together with instructions for application—BUT NO PRICES. A typical page is shown here.

In the second section there is a combination index and price sheet. Regardless of the quantity ordered, the prices are the same, f. o. b., Little Rock. The name of the article is listed in the first column. The next column shows the page number where may be found a picture and description of the article. The third column lists the minimum quantity they are permitted to send in drop shipments from the factory. The next column contains the f. o. b. factory prices, which are in code. Following this are the f. o. b. Little Rock prices, also in code. The last column has the retail price as suggested for the dealer.

At this time the entire line has not been catalogued, but they are at work on it, and as each new page comes from the press, it is placed in an envelope addressed to their salesman, in care of the customer.

There is an envelope for each customer who has a loose-leaf catalog, and these are arranged according to salesmen's routes and cities.



The binding back of the loose-leaf catalog is corrugated to permit expansion as the book grows. An inexpensive post binder of wire and tin holds the pages together

148 Feb. 1, 1921

LITTLE O.D. TUCKER IV & CO. ROCK

ANTI-RATTLERS: WRENCH: VALVE LIFTER: POST BUILDERS: CREEPERS

WOOD CREEPER



ANTI-RATTLING BALL COCKETS FOR FORDS



Made of grey iron, heavy springs, pressed steel cups, machine cut screw plugs. Black baked enamel finish.

CHAMPION X SPARK PLUG WRENCH



Made of certified malleable iron. Dull baked enamel finish. Weight, 7 oz each. Opening, 7-8 and 31-32.

VALVE SPRING LIFTER



Malleable iron.

This creeper is made to fit the back and is comfortable to work on. It is made of seasoned wood and is securely nailed with cement coated nails. The creeper will not rack or pull apart from usage. It is stained a dark brown finish.

The head rest which is fastened permanently to the creeper is neatly upholstered and is made of black enameled drill.

The casters are made of steel and are the ball-bearing swivel type. They will not bind on the creeper and are securely fastened and will not break off or pull away from the wood. We have used special care on this point in making up our creepers as we know the fault of a great many wood creepers is that the casters pull off.

The tool trays on the side are an added convenience not found on metal creepers.

8-15-21. C-1

LITTLE O.D. TUCKER IV & CO. ROCK

C.

ARTICLE	Page No.	Stock No.	Minimum Shipment	V.O. M. Little Factory Price	V.O. M. Little Stock Price	Retail Price
CABINET—French Rayo-Lite Flashlight—						
Gold Onk	117	307	1	OT.EV	OU.EC	—
Mahogany	117	317	1	OT.EV	OU.EC	—
CABLE—Cut Out—						
Steel Wire, per foot	147	28.52	500 ft.	VU	VK	.10
Chain, per foot	147	1663	500 ft.	VU	VK	.10
Camel Back—See Repair Material						
Cans—See Measures.						
CAPS, DUST—For Ford—						
7 Chevrolet	152	1602	100	DV	DC	.50
CAP—Schrader Valve—						
5 to tin box	200	880			DC	.40
CAP—Schrader Kwik-On-and-Off Dust—						
4 to carton	200	3219			UO	.50
CARRIERS—Tire—						
Leather Straps	163	1667	25	OTC	OCV	2.00
Web Straps	163	1668	25	O.OE	OTC	1.75
CARRIER—Adjustable Luggage—						
For running board	203	1672	12	UDV	UEV	4.00
Carbon Removing Outfits—See Welding Equipment						
Carbon Rods and Blocks—See Welding Equipment						
Cells, French Dry—See Batteries						
CEMENT—Vulcanizing—						
1 gallon	108	1144	12	O.RE	O.IO	2.75
5 gallons	108	1145	2	EIC	ROR	10.00
1 barrel (5-5 gallon cans)	108	1146	1	O.CU	O.CR	—
1 barrel (10-5 gallon cans)	108	1147	1	O.UK	O.UI	—
CEMENT—Pure Rubber, Air-Drying Patching—						
3x4-inch tubes	115	349	250	VK	VK	.10
1x4-inch tubes	115	350	250	VR	—	.15
Quart cans	115	350	250	VR	—	.15
Gallon cans	115	350	250	VR	—	.15

Two typical pages from the loose-leaf catalog. At the left is shown how the equipment is illustrated and described, but no prices are listed in this section. The page at the right lists all terms of shipment with the jobber's price in code

About three or four days before the salesman reaches a town, the envelope with all the new sheets and price changes in it, to date, is mailed. This the dealer holds for the salesman. When the full envelope is mailed, another envelope is placed in the tray, making the system perpetual and insuring that each catalog will be kept up-to-date.

When the salesman visits the dealer, he asks for his mail and this is generally given him in the dealer's office. This procedure gives the salesman an excellent opening talk on the new prices and items added to the line. The salesman inserts the new pages in the dealer's catalog and after selling some of the new items, or old items at the new prices, he usually has an opportunity to obtain an order for the goods the dealer needs.

The Tucker company considers this the dominating feature of the new system.

Another influence this system manifests is over the dealer, who is inclined to destroy catalogs or handle them carelessly. When it becomes known that the salesman will make periodical calls to revise this loose-leaf book he is not willing to suffer the embarrassment of being unable to locate it and as a result it receives better care.

MAKING IT EASY FOR THE DEALER TO ORDER

This company believes that when the dealer gets a card stating the salesman will call in a few days he immediately gets the catalog ready. They state they have not had to replace many lost books, which has resulted in a great saving to them of printing costs.

Another part of their book is the combination rush order blank and want sheet. The order is printed on the book page and is perforated so that it may be readily torn from the book. The dealer uses a piece of carbon paper to record the order in duplicate, which is kept in the book. The order when torn from the

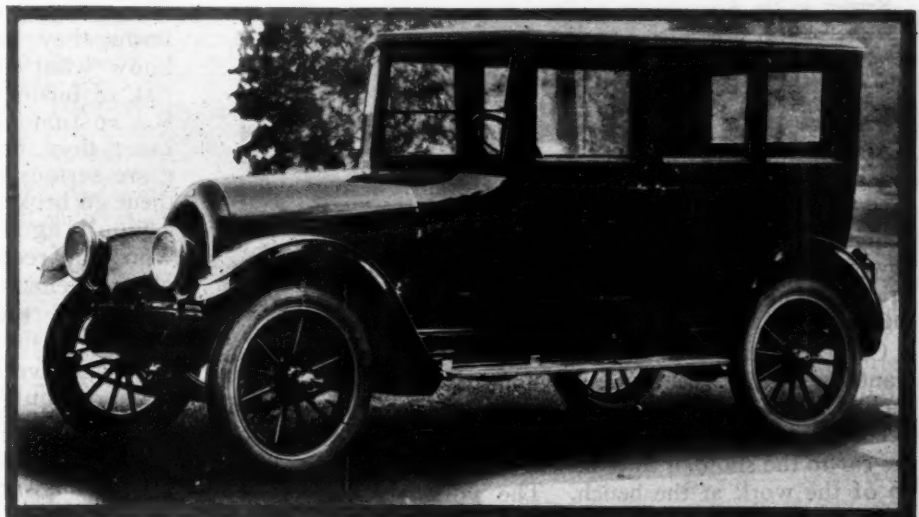
book, folded at two places and clipped, then needs only a two-cent stamp and is ready to mail.

On the opposite side of the duplicate order retained in the book is a form of want sheet on which the dealer may record his future needs till they are sufficient to constitute an order. To make out an order, all that is required is to copy from the left-hand page to the right.

There are twelve sets of the "order and want blanks" to a pad. The eleventh is colored paper and when this is received at the home office it is a signal that a new pad is necessary and one is put into the customer's envelope.

The Tucker company claims the results from the two-fold RUSH ORDER BLANKS have been very profitable.

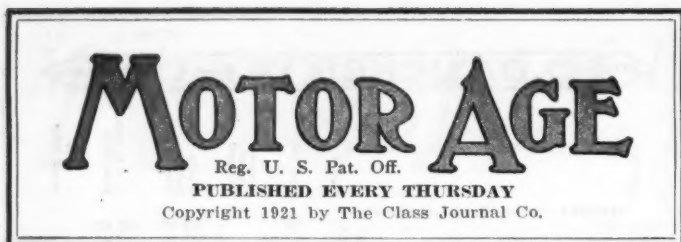
Partition Used in Franklin Touring Limousine



THE Franklin Touring Limousine, the newest addition to the Franklin line, has a fully enclosed two compartment body. A sliding glass partition makes it possible to completely separate the occupants of the rear seat (which is ample for three persons) from the front seat when the car is being chauffeur driven. On the other hand, when the owner wishes to drive himself, the partition can be removed in a few moments, the removal being facilitated by the partition

locks, making an entirely enclosed five-passenger compartment. Both front and rear compartments are upholstered in neutral green broadcloth. There are taffeta shades on the rear and side windows. Other appointments consist of chauffeur's speaking tube, dome lights in each compartment, robe rail, vanity case, smoking set and silk shades. There are also a catch-all tray and ash receiver in the front compartment.

Franklin Automobile Co., Syracuse, N. Y.



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Better Shop Layouts

THE orthodox method of laying out an automotive shop dictates that the shop proper should be at the rear of the building, with preferably a long work bench extending the full width of the building. This long bench probably is put there because, as a rule, there is a row of windows in the back of the building, and the natural tendency is to make use of this light for illuminating the bench.

Cars are parked on the service floor, where all the dismantling and reassembling is done. A close study of such a service station generally shows that too much time is consumed by the mechanics going back and forth from the car to the shop, or long bench. This results in a piling up of the work at the bench. The work is concentrated at one point, whereas it could to advantage be spread over the service floor in such a manner that it would not interfere with the free movement of cars. At the same time the mechanics' time would be conserved and the shop proper would be used for only machine tool operations.

The thought is to have individual work benches, two men to a bench, on the service floor, these benches to be interposed between the cars that are being worked upon. A mechanic then might take down an engine head, remove the valves for grinding, etc., but in case the valves needed refacing, a machine tool operation, the valves would be sent to the shop. Thus, the mechanic would do only the

fitting and adjusting, while the operations of working on the parts would be left to the machinists in the shop.

**Who Sells Tractors?**

IT IS often said that the automobile dealer will not or cannot sell tractors. It is interesting to note, however, that the house organs of the tractor manufacturing companies indicate otherwise. Two tractor house organs are on the desk at this writing. Both of them have a considerable number of illustrations that are designed to promote the sale of tractors. Most of these pictures are of the use of tractors, but in one of these interesting papers there are pictures of five dealers' establishments. These were selected because these dealers have done good work. Three of the five are automotive dealers. The chief advertising on their building sign is for passenger cars. In the other publication the break is almost as good; it is an automotive dealer for each implement dealer.

Evidently these two tractor manufacturers know that they have some very good tractor dealers in the automotive dealer ranks.

**Explain to Jim**

THE other day the owner of a large automotive service shop was talking with members of the MOTOR AGE staff about competition. His shop is quite a large one and he has a higher investment in machinery than the average shop owner. He is a good business man and is making money and building up an increasing business. But his remarks on competition were especially interesting. The following is not quite his exact words, but is in effect what he said:

Our worst competition comes from the alley shops, where boys who have learned the trade in our shop, and others, open business for themselves. These boys have little overhead and usually do not know they have any until too late; they do not know what must be charged as insurance on the risk of business; they compromise their bills with the customers; they do not have an established rate; they have little equipment and slight the more serious jobs; and in the end the majority of them go broke. But the competition is there. Only a month ago, Jim, who was a good mechanic and who was receiving the highest wage paid in my place, opened one of these shops. He started working at cut rates, but yesterday he told me that he was losing money on every job he undertook.

"Did you ever explain to Jim, when he was with you, anything about overhead and other expenses of business?" the speaker was asked.

"No, I can't see that it is any of an employee's business," he answered.

The conversation ran on, and finally this man realized that perhaps he was responsible for this competition which he had spoken of rather bitterly.

The most successful of employers are those who take their employees into their confidence. They explain to them why the customer is charged a considerable advance on the mechanic's wage for the time put on a particular job. They explain to him that they must make charges to cover the cost of rent, light, heat, cleaning mixtures, brooms, non-productive labor, idle hours between jobs, and that the chief of these expenses is the office cost, advertising, and the carrying of the

investment in tools, only a few of which are constantly in use.

Once the mechanic has had these things explained to him in the proper way, he does not feel quite so imposed upon when he sees the charge on the customer's bill, "Labor at \$1.25 per hour."

When this conversation ended, this man said that he was going to see Jim on his return home, take him over to his office, and explain a lot of these things to him and offer to take him back into his service. He was a kindly man, for the last words he said were:

"I am afraid this is going to be a hard winter in our town, and I have been a bit worried about Jim's kids if he should not make good in that shop, and I am sure that he cannot, because he hasn't enough capital."

There is another advantage of an understanding of this kind with the boys in the shop. Once work slackens and expenses must certainly be cut, if the owner is on good terms with the boys he can easily let them see that his earnings are small and that he must share the reduction in his income with someone. They will probably be quite willing to accept a short day or a short week proposal without looking elsewhere for jobs, or without being "sore at the boss."

But really, hustling for more business is the best way to solve the unemployment problem.



The Elusive Saturation Point

THE saturation point, so often definitely indicated by writers who know nothing about automobiles and very little about economics, has been a sore subject with most of the leaders within the industry. Recently there has been a dawn of sense in the treatment of this subject. We are glad to be able to reprint an editorial on this point from The Chicago Evening Post:

"This life of ours has a way of evening up supply and demand in most extraordinary fashion. Various wise ones have been shaking their heads and speaking of the automobile reaching its 'saturation point,' meaning that so many people have automobiles that only a limited 'replacement' supply can be sold. Just about the time we have this all figured out, new uses for the automobile begin to appear. With the coming of concrete roads the automobile street car is created. Immense possibilities in the 'caterpillar' type begin to show themselves (the French have just started using this principle to establish transportation lines across the sands of the Sahara desert). The world does move; it does not stand still. And while it moves, it is a rash man who prophesies an eventual limit on anything."



Strike Tribute to Automotive Vehicles

AS this is written, the railroad strike appears to be hanging in the balance. There are many persons who are confident that it will not take place, and others who are going steadily forward preparing for it. Be the outcome what it may, the threat of a strike has accomplished one great economic service for the American people.

It has turned their eyes to the automotive vehicles as a utility.

During the war, the automotive vehicle rose greatly in public opinion as a utility. When railroad traffic was being restricted and the railroads were failing to serve the public to the maximum of demand then existing, the passenger car and the truck came into their proper places as aids in the great scheme of transportation. The truck, at that time, was pushed into service for which it was unfitted and, like all other good things that serve beyond the proper sphere, was the victim of a reaction.

After the emergency for the truck had passed and the railroads were again willing to accept the short hauls, small parcels of freight at a loss, the truck was more or less relegated to the garage.

Now that transportation is threatened, the truck is again being regarded as of large possibilities in the transportation scheme. Throughout the country great factories are assuring customers that there will be no interruption of freight deliveries regardless of what the railroad men may do. These heads of large business institutions are saying that they will haul coal and deliver their factory products by truck. City officials are canvassing the truck lists in their confines and announcing that the food supply will be maintained by trucks. Everywhere there is a calm consideration of the transportation situation because the truck exists. What greater tribute could be paid to any vehicle.

The estimates now being placed upon the possibilities of the truck are as unwarranted as the reaction after the war emergency. The truck is not today sufficient for the freight transportation needs of the country. Trucks do not exist in sufficient numbers for that service, even if they could compete with the railroads for long haul business. All that is asked on behalf of the truck is a reasonable recognition of its proper sphere as an aid to the railroad transportation. In emergency the truck can do wonders, but it cannot perform this service in competition with well organized, well financed track transportation.

As to passenger car transportation, there is little to be said. The passenger car has long had its proper place as a comfortable, flexible unit of passenger transportation. Its advantage is that it goes over the route that the owner may choose, while the train goes where the track is laid. Its distance limit is measured by the owner's willingness to forego sleep and rest. A considerable tribute has been paid to the passenger car by a large surety company, with 100 offices in this country, which has announced that a schedule of passenger car service has been arranged for this company between its various offices and the necessary traveling of officials and employees will not be curtailed because of the strike.



The Winter Service Number

NEXT week you will receive the winter service number. This number will be more than a collection of articles telling you what operations can best be performed in the winter. It is the aim of the MOTOR AGE staff to make this number an excellent aid to the man who wants to make money in his establishment this winter.

There will be, of course, articles on special winter month shop operations, but there will be also articles telling how other men have made money during the winter in their salesrooms. These will tell how profits have been made selling vehicles and equipment, as well as service.

The best knowledge and practice of many men will be embodied in this number. It will present much more than the ideas of the MOTOR AGE staff, because we have gone freely among the practical, prosperous men of the industry and asked them to tell us what they have done previous seasons and what they are going to do this season.

These men have responded liberally to our request for help on behalf of the man who may be discouraged at the outlook of what he considers the "closed season for profits."

Really there is no "closed season for profits," as we shall try to demonstrate to you.

Nation's Eyes on Motor Vehicles

Trucks and Automobiles to Fend Industrial Paralysis

In Case of Railway Strike Business and Life's Necessities Will Move Slowly but Surely

CHICAGO, Oct. 21—Menace of a general railroad strike which threatens paralysis of rail transportation, has centered the attention of the nation upon motor vehicles.

Motor trucks never have failed in an emergency. They saved France in the great war; they kept business moving during the "outlaw" railroad strike. They will be mobilized to feed the nation, if the railroads cease to function.

In the last great railroad strike the country was helpless, for motor transport was unknown. It is significant that when announcement of the general strike call was made by the Brotherhood leaders Sunday, there were few gasps of apprehension.

Mayors of cities from one end of the country to the other countered immediately with the statement that their people would be fed by the mobilization

(Continued on page 30)

To Ban Hotel Profiteering at New York and Chicago Shows

New York, Oct. 24—The National Automobile Chamber of Commerce already has taken steps to prevent profiteering by New York and Chicago hotels during the automobile shows. A questionnaire has been sent to all hotel managers asking for their regular rates and other information. They are asked to go on record as to whether they will require that a room be taken for a week regardless of the number of days it is used during the show, and whether there will be any increase in rates because of the probable demand for accommodations.

TUCKER BUYS 3-A COMPANY

Little Rock, Ark., Oct. 24—The O. D. Tucker & Co. has purchased the Arkansas Automotive Appliance Co., known as the 3-A Co., and will move the entire stock to its present location, 209 West Third street, where both the retail and wholesale departments will be conducted. The 3-A Co. is one of the largest wholesale automobile accessory concerns in the middle west. The consideration was not made known.

DEALERS BACK WOMEN'S SCHOOL

Cleveland, Oct. 24—Cleveland women who are the wives of members of the Cleveland Automotive Trade Assn., organized the Women's Automobile Club, with 300 members.

Miss Belle Brewer Perreau is president; Mrs. A. O. Williams, secretary, and Mrs. Adam Beltz, treasurer.

One of the first steps taken by the

new club was to accept the invitation of the Cleveland Safety Council to organize a class of women drivers of cars for the chauffeurs' school, which is to be conducted by the council in the Chamber of Commerce auditorium. This instruction will start Dec. 1 and it will be exclusively for women.

It is the first effort made in Cleveland to reduce the number of accidents that are attributed to women, and dealers and distributors here are giving their active assistance to the women.

N.A.C.C. Offer Draws Harding's Thanks

NEW YORK, Oct. 21—Alfred Reeves, general manager of the National Automobile Chamber of Commerce, sent the following telegram to President Harding at the White House:

"Cars and trucks totalling 9,200,000 can protect the public in event of a rail strike.

"We offer the services of the automobile industry in the mobilizing of motor transport, if needed.

"Local automobile owner and dealer associations have the organization, man-power and vision for emergency."

The message was filed at 3 P. M., and its receipt was acknowledged the same night in a letter which expressed the President's cordial thanks for the offer to cooperate, and stated that he would call upon the N. A. C. C., when its services were needed.

Automobile Sold on Time Is "Asset of Purchaser"

Washington, Oct. 21—Part-time payments on automobiles under which purchasers have given notes, change the ownership in bankruptcy cases, according to an interpretation of the Supreme Court in denying a writ of certiorari in the case of the Grinnell Overland Co. This company sold a machine to Thomas L. Mintle, an Iowa farmer. When Mintle filed a petition in bankruptcy the car was attached by the dealers and sold for their own benefit. On appeal to the lower courts, the trustee for Mintle obtained the proceeds from the sale of the automobile, thus making it an asset in bankruptcy proceedings. The Supreme Court upheld this ruling.

Sarles Wins Cotati Race; Hearne and DePalma Tie

Cotati, Calif., Oct. 24—Rosco Sarles drove his Duesenberg to a most exciting victory in the races here today before 15,000 persons. His average rate of speed for the 150-mile race was 108 m.p.h.

Joe Thomas, in a Duesenberg, was second, and Hearne and DePalma tied for third. So close was the finish that third place was given at first to DePalma, but later the judges declared third place a tie.

Automotive Industry Ready to Run on Its Own Wheels

Railway Strike Will Not Hurt Automobile Business Excepting in Far Removed Points

DETROIT, Oct. 22—Leaders in the automotive industry, though agreeing that the railroad strike would be a catastrophe to the business life of the country, are of the opinion that so far as the automotive industry is concerned, the strike, if it has to come, could not come at a better time than at the time apparently scheduled.

So far as shipping of finished cars is concerned, roads all over the country are still open in November and driveways would not be impeded in any way by snow or weather conditions. No one wants to go back to driveways, but no transportation tie-up will affect deliveries except to far removed points.

Unimpeded roads will also permit factories to use their trucks in bringing in supplies, where needed, though most

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Paris Show Draws 720,000 Attendance in 12-Day Run

Paris, Oct. 15 (By Cable)—The Paris automobile show closed Sunday evening after being open 12 days. It was a complete success, with the attendance averaging 60,000 daily. The amount of business done was satisfactory, particularly in the small and medium cars. Manufacturers believe that the depression is now over and that the coming year will be good. Sales were helped by the government announcement this week of an immediate repeal of two cents a litre on the gasoline tax. A further reduction of one cent will be made Jan. 1. It is proposed to make the show annual.

TRADESMEN MEET DEALERS

Seattle, Wash., Oct. 21—King county automotive tradesmen met for the first time with the motor car dealers here recently, at which time the county organization officially completed its affiliation with the state association by amending its bylaws to include the state dues.

President Fred Hill, of the Seattle Motor Car Dealers' division, spoke for the dealers, urging the tradesmen to cooperate with the car distributors in strengthening the industry.

STANDARD PARTS PAYS \$1,000,000

Cleveland, Oct. 24—A million dollars in checks will be mailed on Nov. 1 from general offices of the Standard Parts Co. in this city to creditors of the company. The Standard Parts' condition, which has been in the hands of a receiver for more than a year, is generally accepted as evidence that business is on the upgrade here.

Dealers Get Floor At National Shows

Outlook for Enclosed Car Sales Is Uncommonly Good

Body Makers of Growing Opinion That Price Differences on Various Models Not Justified

NEW YORK, Oct. 25—Summarizing conditions in the automobile field this week, MOTOR AGE finds that the trend of retail trade in passenger cars has shown little deviation in the past week from the level of the last six months. The first half of October was surprisingly good but a gradual slowing up of sales is to be expected in most sections of the country as the touring season closes. The outlook for enclosed car business is uncommonly good, however, and nothing has arisen to change the belief that the aggregate of sales in dollars for October will equal September.

There is evidence of a growing opinion among body makers that there is too great a difference between the prices charged by car manufacturers for open and enclosed models. It is held in some quarters that not all this margin is justified and some body builders are inclined to stand pat on their prices for enclosed jobs until the cost to the ultimate consumer is reduced.

Truck sales are increasing slowly but steadily as general business conditions improve. A filip has been given them by the threat of a general railroad strike. The strike menace has given tremendous emphasis to the essentiality of motor vehicles as transportation units. Their reliability is proved by the fact that the nation has turned instinctively to them in the face of an emergency in the realization that their mobilization will prevent industrial paralysis if the carriers cease to function. Manufacturers and dealers are taking advantage of the opportunity to convert bankers who have been skeptical about handling truck paper.

If there is a railroad strike it will not have a demoralizing effect on automobile production unless it is longer lived than is probable. Most passenger car makers have inventories sufficiently large to permit production for some time without bringing in large quantities of supplies. Such materials as may be needed can be transported to the factories by truck. It will be possible to deliver cars by means of "drive-aways" except to points far distant from factories.

Reports are filtering in from tractor and farm machinery manufacturers that the winter months promise to bring an unexpectedly large volume of business from the rural districts. This is evidence of generally improved conditions in the agricultural sections.

The crop of rumors about impending mergers, combinations and consolidations

is growing larger rapidly. A few of them are plausible but most of them are somewhat ridiculous. Reports of prospective combines of truck concerns are most common and a majority of the companies in the business are mentioned.

While it will be found that few of the reports are founded on fact, it undoubtedly is true that consolidations are in the air and the next few months probably will witness several of them. One which promises success would bring together 14 automotive concerns with physical assets valued at some \$50,000,000. Another even larger combine is contemplated.

Illinois Garage Owners to Pay Annual Fee of \$25

Chicago, Oct. 21—Through decision of the Illinois State Commerce Commission, garage owners throughout the state will be forced to pay an annual license fee of \$25 and, in addition to this, to take out insurance to protect the public from loss, in sums ranging from \$5,000 to \$10,000, the amount being governed by the number of cars in storage. Fees and insurance will add a maximum of \$300 a year to garage overhead and in many cases will put small operators out of business.

Insurance men say that the insurance clause is a double-barreled affair, for the garagemen will not only have to provide protection to the public but will be forced to protect themselves with an additional insurance.

The commerce commission's interpretation of the law which was passed to force licenses upon warehouses is based upon a "sleeper" clause in the bill, passed at the last session of the legislature, which says that no one shall engage in the business of storing personal property without a license issued by the Public Utilities Commission.

Garage owners throughout the state, under the leadership of the Chicago Garage Owners' Assn., will wage a hard fight against the ruling.

Secrecy Surrounds Moves in Jackson Motors Merger

New York, Oct. 21—Close secrecy still shrouds the proposed merger of 14 automotive companies in which the Jackson Motors Corp. and the Traffic Truck Co. will be included. It is believed, however, that the various companies will be taken over by the Associated Motor Industries, which has been incorporated in Delaware with a capital of \$80,000,000.

Every effort has been made to prevent information concerning this corporation from becoming public. The papers were filed by the Corporation Trust Co. of America, which is located in Wilmington. The incorporators of record are attaches of the trust company.

Dealers and Makers in Plan to Unwind Used Car Tangle

Manufacturers Recommended at Joint Conference to Aid in Solving Big Sales Problems

DETROIT, Oct. 22—Committees of the National Automobile Dealers Assn. closed Friday the series of conferences which have been held on contractual relations, by arriving at tentative agreements on the points outlined. These will now be submitted to the membership of the N. A. C. C. for consideration and final action.

In a statement following the meeting, General Manager Alfred Reeves of the N. A. C. C. said his association was in complete harmony with the dealer group and was deeply interested in helping overcome the obstacles now interfering with the safe progress of the industry. Every effort would be made, he said, to clear away the difficulties with which the trade is now faced, so that sales in 1922 should have no unnatural barriers.

One of the important actions taken at the conference in a sales stimulating sense was the decision to make the New York and Chicago National Shows, held under the auspices of the manufacturers, more a merchandising event than they have been in the past. Recommendations will be made to the Show Committee of the N. A. C. C., which are designed to give dealers more opportunity to develop sales on the show floor than at former shows.

A decision to go to the mat with the used car situation immediately was another matter upon which agreement was reached and recommendations will be made to manufacturers at once so that dealers may have united backing in the movement. It was agreed that trade-ins are a necessary factor in doing business, but that they can be handled in such a way that present abuses may be avoided.

Reeves said a survey of the used car situation is now being made which, upon completion, will permit the manufacturers to approach the subject with full knowledge of its ramifications. The process of cure will be slow, he said, in view of the extensiveness of the evil, but it will be brought under control. The committees were agreed that trade-ins in trucks should be discountenanced.

Representatives attending the conference were: for the N. A. C. C., W. E. Metzger, Chairman Colin Campbell, Hal B. Boulden, F. E. Conner, W. E. Voorhis, Percy Owen, Alfred Reeves; for the N. A. D. A., Jesse A. Smith, Harry Harper, N. H. Cartinhour, Fred W. Vesper, J. E. Eldridge, Harry C. Moock. Directors of the N. A. D. A. who had attended a meeting preceding the joint conference, were invited to sit in at the session.

Stewart-Warner Gets Stay on Seager Injunction Writ

**Defendant in Patent Infringement
Suit Gives Bond of \$150,000
—Case Will Be Appealed**

CHICAGO, Oct. 21—The decree in the patent infringement suit of James B. Seager et al against the Stewart-Warner Speedometer Corp., was entered Oct. 17. Upon notice of appeal by Stewart-Warner and by giving a surety bond in the sum of \$150,000, the writ of perpetual injunction was staid until such a time as the case may be finally disposed of by the United States Court of Appeals. The amount of the bond in the case is intended to represent the profits that may accrue from the time of entering the decree to the time of the final disposition of the suit in the Court of Appeals.

The decree in part grants:

(3) That a perpetual writ of injunction be issued forthwith against the defendant, its officers, agents, employees, and confederates, enjoining them from making, using or selling the devices heretofore known as the Stewart Vacuum Gasoline System, or any other device embodying the invention claimed in claim 5 of said Seager patent, or the invention claimed in claim 11 of said Harrington patent, and from offering so to do, and from aiding or abetting or in any way contributing to the infringement of either of said claims of said patents.

(4) That the plaintiffs recover from defendant the damages which they have suffered and the profits which defendant has made by reason of defendant's infringement of said letters patent, etc.

ASK TO SELL ALLEN ASSETS

Columbus, O., Oct. 24 — Receivers George A. Archer and William C. Willard of the Allen Motor Co., of Columbus, have asked Federal Judge J. E. Sater for an order of sale of all of the assets of the company. It is expected that this order will be issued soon and that the plant and all assets will be advertised for sale in the coming month. The assets are estimated at about \$2,000,000 and consist of a large plant on Dublin avenue, equipment, materials and finished product. The claims against the company are equal to the estimated value of the assets.

M. A. T. A. ISSUES ORGAN

Detroit, Oct. 24—The Michigan Automotive Trade Assn. has this week brought out the first edition of the Michigan Automotive Tradesman, its official organ, which will be issued monthly. In introducing it to the state trade, the directors of the association say, in part:

"The great underlying thought in publishing this association organ is to benefit M. A. T. A. members. Four problems will be discussed in its columns, news of general interest to the trade will be published, and, as time goes on, special departments instituted which will carry

suggestions and ideas for the better conduct of your business."

Pictures and the names of men holding office in the association are shown in this first issue with a brief biography of them and a review of the association since its organization in May. Leading articles review the new state abstract law, the Townsend bill's progress, and Michigan road activity.

Washington Service Men to Maintain High Standards

North Yakima, Wash., Oct. 22—To discuss the question of wages for automobile repairmen in North Yakima, Wash., and points in the Inland Empire, and the prices for work charged the public, a meeting of representatives of the repairmen's division of the Automotive Trades Assn. was held here recently.

The discussion took the form of what would best serve the automobile owner and the industry in the long run, and brought out the sentiment that the industry is greatly in need of more men with exceptional mechanical skill. It was said that many such men from other branches of the machinist's craft are now out of employment and might be brought into the automotive repairmen's line of work if remuneration were kept in line with that paid in their own branch.

It was further emphasized by those present that a lowering of wages at this time would mean also a return to standards of workmanship that formerly existed when automobile repairing drew its recruits from the ranks of drivers and others with virtually no craft training.

In the event that any lowering of standards took place it was felt that the owners would in the end be obliged to pay for inefficient work, and would suffer increased rather than decreased costs. At the conclusion of the discussion a vote to maintain present scales of charges and wages carried unanimously.

TIRE SALES AS BUSINESS VANE

Birmingham, Oct. 25—As a barometer of the improved conditions of the automobile industry in the local field the branch office of the Firestone Tire Co. here has done a larger business in the past 90 days than it did during the peak of the war days—and with a smaller sales force. This, according to P. D. Mingle-dorff, manager of the branch, is due to the fact that more cars are moving now than have been moving at any other period since last December.

TIRE SERVICE ENDS AT NIGHT

Louisville, Oct. 22—The hapless motorist whose tire is punctured hereafter—after 11 o'clock at night—probably will remain on the side of a lonely road till morning, unless he makes the repair himself.

Beginning last night virtually every tire service station in the city agreed to close at 11 o'clock at night and to open at 7 o'clock in the morning.

Hitherto it has been the custom to keep open all night. Business did not warrant this plan, it was said.

Say Credit System Costs Automotive Dealers 27%

**Indiana Automotive Trade Association Secretaries Favor Cash
Plan with Lower Prices**

INDIANAPOLIS, Oct. 24—Credit systems, bad accounts reports, cash basis, financing of show buildings, ways and means of maintaining attendance at local meetings, were the subjects discussed in a conference of Indiana secretaries of automobile trade associations in the headquarters of the Indiana Automotive Trade Assn. here recently. The program was handled by C. V. Bender, executive secretary of the Muncie association, which now has 44 members; H. L. Stevens, Logansport secretary; Clem McConaha, Wayne county secretary; Karl F. Voelz, Columbus secretary. The third conference has been fixed for Nov. 17, the same time as the state convention, and will be a part of that program.

Figures were collected and presented to the conference, indicating that it is costing the Indiana automotive dealers 27 per cent to operate on credit systems. This includes the loss by bad accounts, the interest on operating capital, cost of collections and loss of business due the merchant's lack of buying capital for keeping up stocks. It was argued that a reduction of 25 per cent in retail prices could be made by operating on a policy of selling for cash only, and at the same time increase the margin of profit and conduct a cleaner, healthier, more substantial business. Tipton, New Albany and Evansville automotive men are virtually on a cash basis. In Muncie the association has a credit reporting system, which is rapidly driving the automotive dealers to a cash basis.

ROAMER HAS NEW MODEL

Detroit, Oct. 22—Barley Motor Car Co. of Kalamazoo, Mich., manufacturer of the Roamer line, has added a new California top to its models, which will sell for \$2950, f. o. b. Kalamazoo. Shipments of the new model are being made now. The company declares business holding up well and finds assurance of continued demand through the winter.

CORRECTION

Cleveland, Oct. 21—The statement was made by MOTOR AGE of Oct. 13 in its announcement of the National Association of Automotive Bankers that the headquarters would be located in the Gotham National Bank building "in this city." The headquarters will not be located in Cleveland but in the Gotham National Bank building, New York.

"FIREPROOF" GARAGE BURNS

Buffalo, Oct. 21—Fire on Oct. 12 destroyed sixteen automobiles in the public garage of Fred Forness in Union street, Olean, causing loss of more than \$35,000. The garage was of fireproof construction but the flames swept through the interior despite prompt discovery of the blaze.

Labor Department Figures Show Industry Firmly Set

Number Employed in 53 Automobile Factories Shows Only 641 Decrease in Month's Time

WASHINGTON, Oct. 24—Evidence that production of automobiles is running on an even keel is found in the report of the Department of Labor covering labor statistics for September. The report shows that in 53 automobile factories 98,050 men were employed in August, while 97,409 were employed in the same factories last month. This is a reduction of .7 per cent. The payroll for these men was reduced from \$3,214,712 in August to \$3,056,489 in September. In a discussion of wages, the report says:

"A decrease of 10 per cent was reported by six establishments, affecting all of the men in one establishment, 75 per cent in the second, 60 per cent in the third, 50 per cent in the fourth and fifth, and 10 per cent in the sixth. In one shop, decreases ranging from 8 to 10 per cent were made to 75 per cent of the force. Forty per cent of the employees in one concern received a decrease of 8 per cent. The wages of 47 per cent of the force in one plant were reduced 8 per cent. The shop force was reduced eight cents per hour and the office force five per cent in one plant. When comparing the per capita earnings for September with those for August a decrease of 4.3 per cent is noted."

BIRMINGHAM SHOW SUCCESS

Birmingham, Oct. 24—A more pretentious automobile display was attempted at the Alabama State Fair, which closed its 1921 exhibit Oct. 8, this year than ever before. Almost the entire space of the Manufacturer's Building was taken up by the exhibits of Birmingham's leading automobile dealers, and one accessory firm, the exhibitors being led by the display of the Premo car, a local product.

WEST VIRGINIA IN SHOW GRIP

Fairmont, W. Va., Oct. 25—Fairmont will have an automobile show during the coming season if the dealers have to rent a tent under which to make the display. This was the announcement of A. H. Reeves, prominent local dealer, who was active in the management of the very successful show that was held last season in the Billy Sunday tabernacle.

DODGE HEIRS GET PARTITION

Detroit, Oct. 22—Under an agreement finally settling the \$25,000,000 estate of John F. Dodge, John Duval Dodge, cut off in his father's will with \$150 monthly, will receive \$1,600,000. Five other heirs who brought suit for an outright receipt of the money in lieu of a periodical income will receive \$1,000,000 each.

ATLANTA PREPARES 1922 SHOW

Atlanta, Ga., Oct. 22—At a recent meeting of the Atlanta Automobile Dealers'

Assn., when preliminary plans for the 1922 Automobile Show were discussed, it was announced that floor space in excess of that used for the show held during the spring of this year has already been contracted for, and that as a result next year's show promises to be the largest event of its kind ever held in the south.

The show will be held in the Atlanta Auditorium again, where arrangements will be made to provide several thousand more feet of floor space than was available for the 1921 show. A campaign has been started by the Atlanta association to bring every eligible dealer into the organization before the next show.

Louisville Trade Pleased Over Enclosed Car Week

Louisville, Oct. 22—Automobile dealers of Louisville were greatly pleased at the successful results of Enclosed Car Week, which was observed in the Kentucky metropolis Oct. 15 to 22.

As early as two weeks before the show inquiries began to come in to the various dealer establishments after the appearance of the first advertising.

The dealers' committee in charge of Enclosed Car Week was composed of William O. Protsman, chairman; C. S. Potter, J. R. Weir and Secretary Holmes. Exhibits were in individual showrooms.

While it is too early to give actual figures, it can be said that the show was given to stimulate trade, which had shown a tendency to lag during September. The 19 dealers who participated are very enthusiastic about the idea of an enclosed car show at the beginning of the fall and winter season. The vote for a show next fall in Louisville is unanimously "Yes."

TRACTORS FEATURE FAIR

Atlanta, Ga., Oct. 21—While the annual fall automobile show held here each year in connection with the Southeastern Fair, in the Automobile Building at Lakewood park, was not as large this year as it has been in the past, it nevertheless proved a successful event. Several thousand visitors were in the city for the fair during the 10 days it was in progress and most of them also took in the automobile show.

Last year the Atlanta Automobile Dealers' Assn. sponsored the show at the fair but, because of the annual spring show now being conducted by the association, it did not take part in this fall's event.

The power machinery, farm implement and tractor exhibits held in connection with the fair were larger this year than usual, all of the Atlanta branch houses having displays on the grounds.

BUCKEYE SENATOR FOR GRAVEL

Columbus, Oct. 21—The agitation against high-priced improved roads in Ohio, which has been led by Senator Charles Brand of Urbana, still continues. In a public statement issued recently, Senator Brand advocates the adoption of the Indiana gravel road policy, which he claims has been eminently successful.

Durant's Interest May Carry Collins Car to Production

New Peerless Design to Show But Few Important Mechanical Changes—New Bodies

NEW YORK, Oct. 24—Notwithstanding the fact that R. H. Collins has assumed the presidency of the Peerless Motor Car Co. of Cleveland and will take over the active management of the plant, it is possible the development of the new Collins car will be continued in the main building of the old Cadillac plant at Detroit, which was purchased by Collins soon after he left the General Motors Corp. It can be stated upon authority that W. C. Durant personally retains his original interest in the development of the Collins car and would like to see it closely allied with his line. Two very fine six-cylinder cars developed by the Collins engineering staff are now running.

It is probable several changes will be made in the present Peerless organization, although it is understood that some of the present executives of the company will remain under the Collins regime. The present Peerless car will be redesigned, but it is understood few important mechanical changes will be made and that attention in this connection will be centered upon body design.

HAULERS WANT HEAVIER LOADS

Columbus, Oct. 21—The Columbus Commercial Haulers' Assn., formed some time ago to look after the interests of commercial haulers in all lines, at a recent meeting took steps to open a publicity campaign to permit heavier truck loads on the streets and roads. Under the recently enacted Ohio law, the limit of truck loads and cargo is 10 tons, while under an ordinance adopted by the Columbus city council the limit is 12 tons. The Columbus Commercial Haulers' Assn. will work for a 14-ton limit in both the state law and the city ordinance. The association has 29 active and 12 associate members and a large majority of the large haulers are affiliated.

CADILLAC'S NEW SERVICE PLANT

Philadelphia, Oct. 21—A six-story concrete building, comprising 120,000 sq. ft. of floor space, has just been opened to Cadillac owners. There is notably fine shop equipment, including a large number of special tools for repairing cars.

The structure is 180 ft. by 110 ft. in width, has two large elevators for transportation of cars to and from all floors, in addition to the passenger elevator system, and has a Baltimore & Ohio railroad siding on the inside.

SOLDIERS PLAN CAR SHOW

Middletown, Conn., Oct. 21—Members of Company K, Connecticut National Guard, have taken preliminary steps for the staging of an automobile show at the state armory this winter.

IN THE RETAIL FIELD

C. A. Mutter, Moline, Ill., is erecting a motor service block 125 by 60 ft. Tenants so far engaged include A. R. Brumbaugh, who will conduct a vulcanizing shop, and J. E. Wynes, who will operate a battery and electric service station.

C. P. Campbell, Chicago, has been appointed manager of the National Auto Supply Co., Peoria, Ill. The institution is the first branch opened in Illinois outside of Chicago.

Ross Miller, Superior, Wis., and Otis Dover, Paxton, Ill., have formed a partnership and will operate a new garage in Paxton.

C. O. Rigdon and R. G. McFann, formerly Detroit Electric dealers in Denver, Colo., have formed the Rigdon-McFann Co., at Toledo, and will take over distribution of the same vehicles there. Service for all electrics will be rendered by their agency.

Liberty Motor Car Co., Detroit, for the second time within a month reports substantial gains in its dealer organization. New distributors have been established at Grand Rapids, Saginaw, Battle Creek and Kalamazoo, Mich., Binghamton, N. Y., and Peoria, Ill.

John J. Doyle, Gibson City, Ill., has sold the Willard battery station in that place to C. K. Karr and R. S. Jones, both of Paxton, Ill.

Empire Mfg. Co., Franklinville, N. Y., will build a garage 50 by 120 ft. Foundations are laid to bear more than the one story, when required.

Russell Motor Co., Toledo dealer for Velie motor cars, is occupying new quarters for its sales and service. The new location allows for considerable expansion over the previous facilities of the company.

Hudson and Essex, Decatur, Ill., agency has been taken over by Ralph F. Bear, who announces establishment of a service station.

Frank Hilton, who has built up the Ford agency in La Grande, Ore., into one of the largest automobile businesses in eastern Oregon, has sold his business to Eugene Hug, formerly Ford agent in Elgin.

Al Daniels, who has been agent for the Franklin at La Grande, Ore., has sold his business to David I. Stoddard. Wade Siler of Enterprise has been made manager of the Inland Motor Company's garage.

C. C. Davis and W. Culver have formed a partnership at Galesburg, Ill., and will distribute the Studebaker car in the Knox county territory. A complete service station will be conducted. Davis was formerly distributor of the Davis car at Bloomington.

Bengston Auto Supply & Accessory Co., Rockford, Ill., has opened a store and will carry a complete line of motor vehicle accessories and supplies.

J. J. Cratty and L. F. Duffy have formed a partnership at Galesburg, Ill., and will distribute the Stephens car. Cratty has been engaged in the automotive business for seventeen years.

B. S. Davidson, Monmouth, Ill., garage owner, has filed a petition in bankruptcy, his liabilities being given as \$17,668, while his assets are \$3,350, consisting mainly of machinery and tools and accessory stock.

John A. Bateman, Portland, Ore., last week took over the Oregon representation for the Standard Eight, and perfected reorganization of the local company, which is known as the Standard Eight Motor Co. Bateman has been and still is interested in the automobile business in Coos Bay, and is part owner of the White-Humphreys Company of San Francisco.

Ford authorized agency No. 9, Portland, Ore., will be opened here at once as a result of a franchise granted to Frank Hilton and Al Daniels of La Grande. The Ford company maintained but six authorized dealers here for several years, but about two months ago began to expand and since that time have added three more agencies, the franchise granted to the La Grande men being the latest.

French-Wisler Motor Co. has been organized at North Judson, Ind., and will deal in accessories as well as motor cars. The company also plans to operate a garage. The organizers of the company are M. F. French, G. M. French and W. Wisler.

E. W. Steinhart's new garage, Ft. Wayne, Ind., was recently dedicated and big throngs were in attendance. The building is 92 ft. by 150 ft., has three stories and a basement and is splendidly finished throughout. This concern handles the Cadillac and Oakland.

White Co., Cleveland, has established a branch in Louisville for selling and serving White trucks. Announcement was made this week by Charles M. Moon, who has been appointed branch manager. This branch has taken over the business of the White Truck Co. of Louisville, which heretofore operated as a dealer.

Peter Hecht, automobile glass and supplies, has moved into a building recently completed in Philadelphia.

Mackin Motors, Philadelphia, has been appointed distributor of Moon motor cars for the Philadelphia territory, embracing eastern Pennsylvania, southern New Jersey, Delaware and the eastern shore of Maryland.

Rose Wilson Co., Ford agent of Dallas, was destroyed by fire last week. Thirty-five automobiles and a large amount of accessories were ruined. The loss, estimated at \$75,000, was pretty well covered by insurance.

Carolinas Motors Co., Spartansburg, S. C., Oldsmobile dealer, has become the Bell-Brown Motors Co., Dr. Elwood F. Bell having acquired the interest of A. H. Allen.

W. J. McCallum, Portland, Ore., one of the best known automobile men of the city, has been elected to the presidency of the Automobile Sales Co., northwest distributor for the Stephens and local dealer for the Oakland. The company is now located in its new home.

Universal Car Co., Portland, Ore., is now under management of Del Wright. He was the unanimous choice of the associated local Ford dealers for the position as manager of the exchange.

Hartford Windshield Sales Co., Spokane, Wash., distributor of automotive equipment in the Inland Empire, has opened a branch office at 2123 West Sprague street, in charge of J. L. Flanigan.

Allied Motors Corp., of Fairmont, W. Va., which has the agency of the Durant and Peerless cars and G. M. C. trucks, has been capitalized at \$50,000 and the incorporators are J. W. Reeves, G. E. Hulderman, A. H. Reeves, H. Glenn Lake and A. P. Brady, all of Fairmont.

J. G. Riga & Sons Co., Springfield, Mass., has opened its new sales and service building. Doing a wholesale and retail business in tires and supplies, the company has branches in Holyoke and Pittsfield. Recently the concern became distributor for Ajax tires in this district.

Williams Motor Sales Co., Springfield, Mass., distributor for Dodge Brothers, has adopted a policy of expansion. A Dodge agency in Greenfield is the latest advance step. Over 175 cars have been delivered by Dodge Brothers in this territory since price reductions became effective in June.

E. B. Simonds has taken over the Chandler, Cleveland and Franklin agencies at Lockport, N. Y., and has begun business under the name of the Niagara Garage & Sales Co.

W. Frank Horn, Inc., Milwaukee, distributor of standard automotive equipment and electrical apparatus in Wisconsin, has moved into its new four-story warehouse, office and service building at 262-264 Fifth Street.

John G. Wollaeger Co., Milwaukee, state distributor of the Studebaker, has plans for a new \$120,000 sales and service building, 90 by 120 ft., four stories and basement, to be erected during the winter months. It is one of the pioneer distributors in Milwaukee and has occupied its present location for nearly fourteen years.

Redner Automobile Co., Neenah, Wis., distributor of the Peerless in northern Wisconsin, has been granted the entire state territory and has opened new headquarters and general offices at 705 Chestnut street, Milwaukee.

Dort Motor Car Co., Milwaukee, distributor of the Dort in Wisconsin and Upper Michigan, will build a new headquarters building costing about \$50,000. It will be 120 by 120 ft., one story and part basement, with foundations for four stories.

Stearns Sales Agency, Milwaukee, distributor of the Stearns and Rolls-Royce, has acquired an adjoining site, 55 by 150 ft., and will build a 2-story addition of this area, equipped principally as a service station. Work probably will not start until spring. N. E. Winslow is general manager.

Wisconsin White Co., Milwaukee, has been incorporated with a capital stock of \$25,000 to take over the distribution of the White in Milwaukee and the Wisconsin territory. The incorporators are Elmer J. Groth and David S. Rose and Harry S. Sloan, attorneys, Plankinton Arcade, Milwaukee.

Auttac Co., Milwaukee, is a new \$50,000 corporation organized by Paul Gray, H. W. Kuechle and A. G. Kuechle to act as wholesale distributor in Wisconsin of a line of standard automotive equipment and specialties.

J. P. Bertsche, Manitowoc, Wis., has been appointed Wisconsin distributor of the new Coats steam car, made in Indianapolis, which will be exhibited for the first time in Wisconsin at the annual Milwaukee show, Jan. 19 to 25, and be ready for regular deliveries March 1, 1922. Mr. Bertsche intends to establish headquarters in Milwaukee later.

New Kansas City Speedway to Hold Pace of 120 M. P. H.

Oval Built of Wood Will Be 1 1/4 Mile Course and Ready for Racing Next May

KANSAS CITY, Mo., Oct. 22—The Kansas City Speedway Assn., incorporated in Missouri, has completed plans for a mile and a quarter track in this city and promises to have it completed ready for the first races next May. The oval will be a reproduction, with improvements, of the Los Angeles track. The speedway, which will cost in the neighborhood of \$700,000, will be built of wood to hold speed to 120 m.p.h. Seating capacity for 24,000 persons will be arranged.

The new speedway will be 800 miles from competition on the east, Indianapolis, and 1800 miles from Los Angeles, the nearest racing point west. It is hoped to popularize this mid-west track by making it the jump-off point for drivers to and from points east and west. Jack Prince, well-known speedway builder, will have charge of construction.

Officers of the association are: W. D. Turner, president; C. L. McKay, vice-president; H. E. Sloan, secretary and manager.

CLOSES NEW ENGLAND BRANCH

Springfield, Mass., Oct. 21—The Willys-Overland Co. is to discontinue its Springfield branch Nov. 1, and the distribution of its cars in this territory will be placed in the hands of some reliable dealer. This is in conformance with the company's policy of reducing costs and getting in closer relations with the dealers. The Willys-Overland building at Chestnut and Winter streets will be sold. This building was erected five years ago and is one of the best appointed sales and service establishments in New England. It is understood that William G. Northrup, the present manager of the Springfield branch, is to take charge of the Boston branch, which will be the distributing medium for this district.

CAMP SITE FOR CLEVELAND

Cleveland, Oct. 24—The city of Cleveland will be asked to establish a camping site for tourists and it is planned to induce the city to make it one of the best equipped places of the kind in the country. Signs will be displayed on all roads entering the city, advising drivers to patronize dealers and garages who display the automotive trade association emblem.

DIXIE FLYER PRICES DOWN

Louisville, Ky., Oct. 21—The Kentucky Wagon Mfg. Co., manufacturer of the Dixie Flyer, has made the following price reductions:

	Old	New
5-passenger touring	\$1,445	\$1,345
Sport touring	1,945	1,545
Roadster	1,445	1,345
Coupe	2,295	1,995
Sedan	2,345	1,995

BUSINESS NOTES

Adams Axle Co., of Findlay, O., has closed a contract with Durant Motors, Inc., to manufacture all axles and brake bands for the new Durant cars. The plant has 180 men at work now and expects to double this force soon.

Grover C. Kingdom, Inc., Rochester, N. Y., tire and accessory dealers, has increased its capital stock to \$250,000. Cord tires are to be manufactured by an automatic process, using the short staple American cotton as cord basis.

Lightning Chain Auto Wheel Corp., Rochester, N. Y., has purchased property in the Buffalo road and will begin manufacture by Nov. 1 of the Roblin demountable rim retaining device.

Davis Machine Tool Co., Inc., Rochester, N. Y., manufacturer of various products for automobile concerns, has been placed in a receivership. The company lists assets approximating \$1,130,000 and admits liabilities of \$283,300. Morton H. Anderson, vice-president of the Symington-Anderson Corporation, has been appointed receiver in equity.

Jordan Motor Car Co.'s factory is now running at full capacity, employing thirty per cent more men than ever before. The production is now on the basis of five hundred cars per month, and orders have been taken which will keep the factory going at full speed until the first of the year at least.

Moore Motor Co. plant here has been purchased by the L. C. Graves Co., a corporation of Springboro, Penn., manufacturer of commercial car and truck bodies, and will operate under the name of the United Automotive Body Co., employing approximately 500 men. The United Automotive Body Co., Cleveland, O., was recently absorbed by the L. C. Graves corporation.

J. H. Chapman and J. M. Baker have formed a partnership and will open a new automobile supply house in Toledo.

H. A. Wood Manufacturing Co., Belleville, Ont., has secured the Canadian rights for the Alemite products, chief of which is a lubricating system for automobiles. The Belleville company proposes to manufacture for the Canadian market and may later branch out into the export field, particularly within the British empire.

Henney & Company, Freeport, Ill., are specializing in funeral motor cars, and report a notable advance in this field of motor hearses. Aluminum tinting is now the popular color. The cars now in demand weigh from 3500 to 4100 pounds and with a wheelbase ranging from 138 to 142 inches. All are equipped with a six-cylinder motor.

New Britain Machine Co., New Britain, Conn., will temporarily suspend the manufacture of the N. B. tractors. The closing down of the plant will affect about 50 men. A small force will be retained to assemble those tractors which have already been ordered.

Bassick Mfg. Co., Chicago, manufacturer of the Alemite high pressure lubricating system, has instituted suit against the Ireland & Matthews Co., Detroit, manufacturer of the Grees-Gun lubricating system. Bassick claims that Ireland & Matthews infringe the Alemite patents.

Wills Sainte Claire, in a statement last week, announced that it had a sales organization consisting of 21 distributors and 85 dealers.

Beaver Mill, North Adams, Mass., devoted to the manufacture of cord for automobile tires, will resume operations next Monday morning, according to the announcement of plant officials today.

S. F. Bowser Co., Ft. Wayne, Ind., manufacturer of oil tanks and pumps, which has been running on part time during the summer months, has announced that business has increased so much that the full force of employees will be employed on full time again starting with the first of November.

Forer & Forer and the Springfield Snubber Co. will be in new quarters about Dec. 15. Tires and a general line of supplies will be carried and the Ray battery service will continue to be a feature.

V. Krefl Co., manufacturer of automotive equipment, formerly the V. Krefl Mfg. Co. of Two Rivers, Wis., has started work on its new factory at Eagle River, Wis. The new concern, a re-incorporation of the original Two Rivers company, is capitalized at \$75,000. Victor Krefl is president and general manager.

Slinger gray iron foundry at Slinger (formerly Schleisingerville), Wis., has been taken over and will be placed in operation at once by a new concern, the Biever Casting Co., which has been incorporated with \$25,000 capital by John H. and Edmund J. Biever. The plant will specialize in light and medium weight gray iron castings for the automotive and agricultural implement industries.

Adco Dry Storage Co., manufacturer of a dry-cell type of storage battery for motor vehicles, telephone and telegraph systems, farm lighting plants, etc., is now in quantity production in its new factory at Jefferson, Wis.

Lake Laboratories, Inc., Elkhart Lake, Wis., is the name of a new corporation organized to do research, development and construction work in the automotive engineering fields.

Red Arrow Products Co., Milwaukee, has been incorporated with a capital stock of \$25,000, to engage in the manufacture of gasoline and oil pumps and other public and private garage equipment specialties.

Kelly-Springfield Tire Co.'s ten-year 8 per cent sinking fund gold notes are now ready for delivery with coupons attached in exchange for and upon surrender of the temporary notes at the office of the Central Union Trust Co., New York.

Andy Burt Motors Co. has been incorporated under the laws of Illinois as Illinois distributors for Oilzum oils, the Schaap piston ring, Mikesell Bros. brake lining, and the Rochester Duesenberg motor.

C. O. Grigsby and B. J. Grigsby have sold their controlling interests in the Anderson Electric & Equipment Co. to A. I. Appleton, of the Appleton Electric Co. The Grigsbys expect to re-enter the accessory business.

Midwestern Tractor Wheel Co., Detroit, manufacturing a patented tractor wheel with adjustable cleats, has purchased a site at Amherstburg, Ont., where it will erect a factory.

L. C. Tomlinson, who has been in battery business in Toledo for 15 years, has opened a new battery service station under the firm name of Vesta Battery Service.

RECEIVER FOR MUTUAL TRUCK CO.

Indianapolis, Oct. 21—At a hearing recently at Sullivan, Ind., the Mutual Truck Co. of that city was declared insolvent and the National Bank of Sullivan was appointed receiver. Luther Steele, vice president of the concern, testified that the liabilities of the company amounted approximately to \$85,000. He was unable to state definitely the assets of the firm, but said the personal property alone would total something near \$45,000.

SHAW BROS. TO MAKE CAR

Detroit, Oct. 21—Shaw Bros. Motor Car Co., with capitalization said to be as high as \$3,000,000, is being organized in this city for the manufacture of a car to sell around \$700 or \$800 and to be ready by national show time. William Shaw was at once time connected with the Buick sales department.

New York District Sales' Decline Less Than Normal

September Deliveries Show Drop of Only 274 From August Total; June Highest Month

NEW YORK, Oct. 24—Registrations of new cars of 88 makes in 10 counties in and around New York City in September number 4301, as compared with 4575 in August and 7012 in June, the high month of the year. The figures, just compiled by Sherlock & Arnold, publishers of the Automobile Sales Analysis, show a drop of only 274 in September from the August total, which is less than a normal decline, as August usually has a spurt due to pre-Labor day sales, while September ordinarily has a "dead" week immediately following this holiday, which brings so many people in from vacations and is given up to getting settled and back to work.

Registrations, which are equivalent to deliveries in the 10 counties follow for the months of the year up to date:

	Approx. below \$2500	Approx. above \$2500	Total
January	483	146	629
February	1,409	210	1,619
March	3,396	488	3,884
April	4,811	575	5,382
May	5,468	584	6,052
June	6,522	490	7,012
July	5,457	386	5,843
August	4,216	350	4,566
September	3,986	315	4,301
Total to date....	35,755	3,546	39,301

OJIBWAY GETS DODGE PLANT

Detroit, Oct. 22—Arrangements have been virtually completed by Dodge Brothers for the manufacture of cars in Canada, the Canadian company comprising the same owners and officers as the American company. Negotiations for a factory site in Ojibway, one of the border cities, are near the closing point.

No secret is made of the intention to manufacture in Canada as soon as business conditions are deemed favorable. An executive at the Dodge factory said: "We are prepared to go in for manufacture in Canada on a large scale as soon as we consider conditions right. This is not likely, however, to be for some time to come."

BUCKEYES PICK COMMITTEES

Columbus, O., Oct. 22—The Columbus Automobile Trade Assn. has named the general committee on entertainment for the coming annual meeting of the Ohio Automobile Trade Assn., which will be held in Columbus the second week in December. F. H. Lawwell is chairman. Other members are A. B. Coates and Price Kinney.

DRIGGS BUILDS 25 CARS

New Haven, Conn., Oct. 22—The Driggs Mfg. Co., which was formed some time ago to build a line of passenger cars, has completed the test car and a first lot of 25 cars is being put through for production.

Orders Portage Rubber Co.

Be Sold to F. A. Seiberling

Akron, Oct. 21—The Portage Rubber Co. has been ordered sold to F. A. Seiberling, formerly president of Goodyear Tire & Rubber Co., unless a new petition of demurrer is filed in 10 days by Harry L. Snyder, referee in bankruptcy. Creditors will receive between 75 cts. and 80 cts. on the dollar. Liquidated claims amount to \$1,800,000; cash and accounts receivable, less reserve for doubtful accounts, amount to \$600,000. Inventory, which was figured at \$840,000, has appreciated to approximately \$1,000,000 since the receivership was inaugurated. Seiberling has offered \$750,000 in preferred stock for the plant and cash for the inventory. It is doubtful any move to prevent the sale will be started.

Four Used Car Dealers Make \$2,300—36 Lose \$193,000

Many Indiana Dealers Have from 10 to 61 Trade-in Vehicles on Their Hands

INDIANAPOLIS, Oct. 22—Thirty-six Indianapolis automobile merchants lost a total of \$193,000 in the trading and selling at retail of 2972 used cars since Jan. 1. Only four of 40 automobile merchants realized a profit on the handling of used cars in that same period. Their combined profits aggregated \$2300.

That is the graphic story of the "used car situation" in Indianapolis. It is a pretty fair barometer of the used car situation in the state. In one corner of the state, New Albany, one dealer has 57 used cars on hand. No other dealer in the city has more than 10.

In Evansville one dealer has 61 used cars. In Terre Haute several have as many as 35. Fort Wayne, Logansport, Lafayette, South Bend and Marion all report one or more merchants heavily loaded. In only a few spots where the dealers have been almost 100 per cent in their association cooperation is the used car situation good, or, rather, is not menacing.

Everywhere the dealers are seeking the "answer," which seems to account for the unusual interest that is being taken in the "Indianapolis plan" of harmonizing policies in the trading of cars. One of the exclusive used car businesses here is reported to be ready to check out. One Indianapolis new car dealer had an opportunity to clean out a used car stock. He swapped his 14 used cars for a farm of 160 acres in Jackson county. He is not going to use it for a used car park, but, also, he asserts, he is not going to trade in used cars this winter.

Harper & Harper New Firm Succeeding Overland-Harper

Philadelphia, Oct. 21—Harry B. Harper, president and general manager of the Overland-Harper Co., formerly distributor of Overland and Willys-Knight which sold out its business, including the repair-shops, to Willys-Overland, Inc., to be used as a branch of the factory, is now associated with his brother, Paul I. Harper, in the firm of Harper & Harper, handling Handley-Knight and Willys-Knight cars. Paul I. Harper for eight years served under Henry Ford. In 1910, he organized, with another brother, the Harper-Overland Co., in Washington. In 1917 he sold out his interest and went to France. After his return in 1919 he joined the Overland-Harper Co., of Philadelphia, as secretary and treasurer.

Philadelphia, Oct. 22—John N. Willys, head of the Willys-Overland Co., and Walter P. Chrysler, executive vice president and general manager, made addresses at a get-together meeting of 600 dealers in Overland and Willys-Knight cars, at which Harry B. Harper, retiring

head of the Overland-Harper Co., was toastmaster. Following the speeches, the dealers, who were from eastern Pennsylvania, southern New Jersey, Delaware, Maryland, eastern West Virginia and portions of North Carolina, were introduced to the new house organization of Willys-Overland, Inc., which succeeds the Overland-Harper Co.

Horses for a Century—Automobiles Forever

ROCHESTER, Oct. 24—As long as horses were the principal motive power of transportation the firm of James Cullen & Son, of this city, did a thriving business, but the advent of the automobile as the chief medium of transportation terminated its history of blacksmithing that began a century ago, and involved three generations of the Cullens. With the passing of the blacksmithing firm, the history of the automobile repair firm and accessory store of James Cullen & Son will begin, for the only surviving blacksmithing Cullen has decided to perpetuate the firm name in this manner. The firm was founded in 1820.

Two Tire Reductions Said to Precede General Drop

Akron, Oct. 21—The Miller Rubber Co. has made a 15 per cent reduction in price on the two most popular sizes of its fabric non-skid automobile tires. This is accepted in Akron as the beginning of another general tire price reduction, although no other Akron company will admit that it contemplates reductions. The Miller reductions cover the 30 by 3½ and 30 by 3.

Kent, O., Oct. 21—D. M. Mason, general manager of the Mason Rubber Co., announces a 15 per cent price reduction on cord tires, beginning at once. He states that the reduction is made possible by capacity production and "absolute freedom from high cost inventories."

JORDAN RUNNING AT CAPACITY

Cleveland, Oct. 24—Business at the plant of the Jordan Motor Co. is running on a capacity basis, according to a statement of President Edward S. Jordan. He says the corporation is employing 30 per cent more men now than last month and that it is turning out about 500 cars a month. One day last week the company shipped 29 cars, but the average is around 25.

SELLS 37 CARS IN TWO WEEKS

Spokane, Wash., Oct. 22—In evidence of the fact that the automobile business in Spokane is not altogether marking time, the case of the recent sales by the Mitchell, Lewis & Staver Co. is worth mention. In a two weeks' drive the firm sold and delivered 37 cars, took in 14 and resold 11 of these.

Allied Motor Commerce in Indianapolis Association

Industries Using Trucks Will Be Able to Centralize Full Power on Any Problem

INDIANAPOLIS, Oct. 24—Allied Motor Commerce, Inc., believed to be the first organization of its kind, was formed in this city recently. The constitution of the association dedicates it to the pursuits that will have valuable influence on the development of motor vehicle commerce.

Without usurping any powers of any other organization, Allied Motors Commerce is to provide a state conference of all industries using motor trucks in business. Through centralization in the association the full power of motor commerce in the state of Indiana can be brought to bear on any problem. Tom Snyder of the Indiana Highway & Transport Assn. and L. M. Shaw of the Indiana Automotive Trade Assn. were organizers of the new organization.

Interests represented in the permanent organization meeting were the Master Plumbers' Assn., Indianapolis Transfer Assn., Indiana Transfer & Warehousemen's Assn., Indiana Automotive Trade Assn., Indiana Assn. of Electrical Contractors, Indianapolis Commercial Warehousemen, Indiana Highway Transport & Terminal Assn., Indianapolis Coal Dealers' Assn., the Associated Cleaners & Dyers of Indiana, and the Indianapolis Sand & Gravel Assn.

It is anticipated that by Jan. 1, 1922, the organization will have 17 Indiana state bodies affiliated, representing some 20,000 of the 45,000 motor trucks operating in Indiana.

PUNCHED CARD MEANS FINE

Harrisburg, Pa., Oct. 22—State policemen on road patrol duty now carry a punch to clip the registration cards of motorists caught violating the motor laws of the state. Major Lynn G. Adams, superintendent of the state police, issued the order.

A code will be used whereby the position of the punch hole will indicate the offense of the motorist, and a driver who has one punch on his registration card can count on an immediate arrest if he is caught a second time.

OVERLAND DEALERS' CONVENTION

Cleveland, Oct. 22—Eighty dealers of the Cleveland branch of the Willys-Overland, representing the eastern half of Ohio, held their annual convention here at the agency headquarters last week.

A. C. Barber, of Toledo, general sales manager, who was the chief speaker, declared that in September the Overland organization manufactured and sold more motor cars than in any other month during the last four years. He asserted that he would be surprised if October sales did not run above those for September.

New Maxwell Models About Ready for Production

Bodies Larger, Frame Redesigned; Many Changes Throughout Car; Prices Not Announced

DETROIT, Oct. 25—Maxwell Motor Car Co. is about to enter production on its new series. The changes are principally in the larger and more substantial bodies and a stronger and completely redesigned frame. The same four-cylinder engine is employed with only minor changes. In exterior appearance, the car has been substantially improved. The radiator is higher and larger. The bodies have been refined from one end to the other, and mechanical improvements include the adoption of Alemite chassis lubrication, easier clutch and brake action, longer springs, new mounting of starting motor on the bell housing, new type of tire carrier, and thorough equipment or anti-rattle devices throughout the chassis and body.

Probably the outstanding feature of the new series is the superior trim and fitting of the new bodies. Real leather upholstery is used in the open cars and special broadcloth in the enclosed. The seat and back cushions are greatly improved. All doors are provided with pockets and the side curtains open with the doors on solid rods and supports. There is a plate glass window in the rear curtain of the open cars and the equipment now includes the drum type of headlamp, motor driven horn, better set of tools and better body hardware. The new 31 by 4 cord tires are employed which help to make the car lower. Prices have not yet been fixed.

POSSUMS GRACE DODGE SHOW

Atlanta, Ga., Oct. 22—An interesting display on Automobile Row in Atlanta during the third week in October was arranged by Black & Maffett, Dodge Brothers distributor in Georgia. The company's showrooms were converted into a harvest scene, including autumn leaves, fodder shocks, a small field of corn, and a barnyard scene. Prominent in the display was a persimmon tree in which two live possums lent a touch of reality to the scene. "Dodgeville" was the name selected by Black & Maffett for the showroom during the progress of the sale.

REPLACE WOMEN WITH MEN

Anderson, Ind., Oct. 14—Announcement has been officially made at the Remy Electric Co. plant that its contribution to the nation-wide effort to relieve unemployment would be the placing of men in positions now held by women, particularly in the cases where married women are concerned.

THROWS GLOVE AT BUSES

Atlantic City, Oct. 14—At the fortieth annual convention of the American Electric Railway Assn., held here, the possibility of cooperation between motor bus

lines and street car lines was virtually ignored.

Speeches made by the various members and others indicated that motor bus competition is feared by the street car lines and the tone of the talk indicated a desire to put the motor bus out of business rather than an appreciation of the fact that the bus has come to stay and a desire to meet the situation on that basis.

There was a progressive element, though not a large one, which desired to recognize motor bus competition by attempting to absorb and control it.

Willys Distributors Change to Dealers Under New Plan

Toledo, Oct. 24—The total production for 1921 of the Willys plant here is estimated at 60,000 cars. It is believed that the production and sale of this number of motor cars under market and manufacturing conditions indicate strength in the company.

Many of the Overland distributors who were eliminated as middlemen under a new plan of organization which becomes effective Nov. 1, have come back into the organization as individual dealers. The dealers who formerly sold cars under distributors have also become individual dealers, directly dealing with the factory distributing organization—Willys-Overland, Inc.

ATLANTA OVERLAND BRANCH EXPANDS

Atlanta, Ga., Oct. 22—The Atlanta branch of the Willys-Overland Co., Inc., of Toledo, is to be greatly expanded in the near future so that it will have the necessary organization and facilities to supervise, in addition to its present territory, 14 other sales units in the south, according to E. N. Culver, assistant general sales manager, recently in Atlanta arranging for the expansion of the branch. The parts and service departments are to be largely increased, in addition to the sales department. M. S. Metzger, present manager of the Atlanta branch, will continue in charge. All of the southern territory east of the Mississippi river will be handled through the Atlanta branch.

REVIVE DIRT TRACK RACES

Philadelphia, Oct. 7—After a lapse of 13 years, automobile racing was revived at Barney Owen's old half-mile track where, Oct. 1, a big following of racing fans watched some 15 cars vie for the cash prizes offered. Events from one-mile time trials to 15 miles were held. Aside from Harry Lang's going through the fence with his Oldsmobile in the fifth lap of the 15-mile race, everything was run off in clock-like order.

WASHINGTON BUYS 9965 CARS

Olympia, Wash., Oct. 21—A report from the motor vehicle department shows that for the fiscal year 1920 up to Aug. 31 a total of 172,046 licenses were issued for all kinds of motor vehicles. To the same date in 1921 a total of 182,011 licenses were issued, an increase of 9965.

Tractor Sales Take Jump in South on Cotton Rise

Dealers in Smaller Machines Having Trouble Supplying Demand in Some Sections

ATLANTA, GA., Oct. 24—Tractor sales in the Atlanta territory the first two weeks of October were better than they have been at any time within the past year, due to the recent increases in the prices of farm products, principally cotton. Few large tractors are selling in the southeast but the demand for the smaller machines has been so great the past three or four weeks that some dealers are unable to secure all of the tractors of this kind that they can sell.

J. C. Phillips, Cletrac dealer at Rome, Ga., sold four smaller tractors in one day the early part of October. Virtually all of the dealers throughout Georgia are reporting good business.

Business in middle and eastern Tennessee has been good all summer and is unusually good at this time. In North Carolina and Alabama conditions have picked up materially the past three weeks and are getting better daily. Sales in South Carolina, however, are still rather poor and have been all year. In Florida, and especially the southern part of the state, sales are at normal for the first time in almost two years. Several thousand acres of land in the Florida Everglades are being reclaimed for agricultural pursuits and dozens of tractors are being sold in that vicinity.

As a whole, the tractor business in the southeast for September and October of this year is substantially better than the same two months in 1920.

BECKMAN WITH RICHELIEU

Asbury Park, N. J., Oct. 21—William Beckman, for many years assistant to Fred S. Duesenberg and, prior to that, chief engineer of the Loew-Victor Engine Co. of Chicago, is now vice-president in charge of engineering of the newly formed Richelieu Motor Car Corp. of Asbury Park.

The company is assembling chassis in a temporary plant, while the bodies are being fitted at the plant of the Fleetwood Metal Body Co. The directors of the Richelieu corporation are interlocking with those of the Rochester Motors Corp., and the car will be powered with a four-cylinder Rochester-Duesenberg engine.

SALES AT PUYALLUP FAIR

Tacoma, Oct. 14—The 1921 fall tractor, truck, automobile and automobile accessory exhibit held for the last few years in connection with the Western Washington Fair at Puyallup, Wash., again proved to be the feature of the fair.

Upwards of 100,000 people paid more than \$66,000 into the hands of the management, and in consequence the automotive dealers of western Washington all had well filled prospect lists and many cash sales to show at the end of the week.

Trucks and Automobiles to Fend Industrial Paralysis

In Case of Railway Strike Business and Life's Necessities Will Move Slowly but Surely

(Continued from page 22)

of huge fleets of trucks to bring in and distribute food.

If no trains are run, the mails will be transported by motor trucks and airplane.

Industrial paralysis will not follow a general strike, because many factories can be kept in operation by the use of trucks to haul supplies and finished products.

Motor trucks figure prominently in the plans of the administration for meeting a strike. The War, Navy and Agriculture departments are surveying the field to determine the number of trucks which can be mobilized. The same procedure is being followed by many states and by countless cities.

No matter how long a strike may last, the motor truck will save the nation from starvation and will keep the wheels of industry moving.

Since the "Big Five" walked out of the railway strike conference here last Thursday, Chicago, through its Association of Commerce, has started defensive measures in case of a railway tie-up. The Association of Commerce, through committees, will look after the city's food supply, fuel and suburban transportation. The city has food for three months and coal enough, under emergency measures, to last for a year. The milk supply is within less than 100 miles and will be handled by motor trucks.

New York Well Secured

New York, Oct. 21—More than 57,000 motor trucks are available in the five boroughs of New York to transport food and other necessities in the event of a strike. It is estimated they could transport 228,000,000 pounds of food a day, if it could be obtained within a day's journey of the city. The United States Army has about 200, 3½-ton trucks in the city and the Navy about half that number. Only about half these trucks are being used by the government and the others will be available in an emergency.

A special meeting of the Motor Truck Assn. has been called to gather data necessary for the immediate mobilization of motor equipment. Similar information is being collected by Health Commissioner Copeland who will have charge of the rationing of the city in an emergency.

If there is danger of an actual food shortage it is probable officers of the Motor Transport Service of the Army may be asked to take charge of the service under plans which were worked out in 1919. The distribution of food by the Motor Corps, which will be mobilized, will be under the direction of the Health Department.

No decision has been reached by the American Railway Express Co. and other owners of large fleets of trucks as to what disposition they will make of their vehicles if the railroad ceases to function.

Motion picture interests are making arrangements to distribute films by truck if it becomes impossible to move them by express.

Motor Vehicles Can Save Day

CHICAGO, Oct. 21—The 990,000 motor trucks in use in the United States hauled 1,200,000 tons of freight in 1920, or half as much as the railroads carried. These vehicles can readily handle the more essential products in case of a strike. There are 3,000,000 motor vehicles in use on the farms of the country, including 139,000 trucks. If the motor vehicles in any large community were mobilized for the emergency, they could readily handle the suburban and interurban passenger traffic which ordinarily goes to the railroads. This is true even in great centers like New York and Chicago.

Aircraft Association Offers Aid

New York, Oct. 21—The Manufacturers' Aircraft Assn., representing the majority of American builders of airplanes, has sent the following telegram to Secretary Hoover:

"There are at least 750 commercial aircraft available for the general carriage of passengers, mail and express. They are of both land and water, cargo and passenger types. Fifty are in commission in the vicinity of New York. Others in proportion are available out of Boston, Philadelphia, Baltimore, Key West, New Orleans, Kansas City, Dayton, Cleveland, Chicago, Buffalo, Minneapolis, points in Texas, Los Angeles, San Francisco and Seattle. The aircraft carry from two persons, or their equivalent in weight, to 11 or 12, and have a non-stop range of flight from 200 to 800 miles. Arrangements must be made for fuel and service, and we advise that municipalities that wish to avail themselves of aerial transportation place their air ports in condition."

Mobilization in Cleveland

Cleveland, Oct. 18—Plans have been laid for the mobilization of the automotive industry in this city to provide ample transportation for the necessities of life in the event of a railroad strike.

Mobilization of the industry is being carried through under the direction of the Cleveland Trade Assn. and the Cleveland Automobile Club. It is proposed to gather a fleet of 7,000 trucks to tour the rural districts and bring in supplies.

Geo. K. Wadsworth, vice president of the Ohio General Motors Corp. and chairman of the commercial car division of the Automobile Trade Assn., called a special meeting of his division to plan

for any emergency that might arise. Wadsworth says that sufficient trucks can be mobilized to provide food to carry Cleveland through the crisis. He asserts that the motor vehicle can bring in sufficient fuel also.

The large cities of the state such as Toledo, Columbus, Cincinnati, Cleveland, Akron, Canton and Youngstown are situated on main market roads which are improved and in first class condition for heavy traffic. An interchange of products between these cities is planned.

Government Depends Upon Truck Fleet In Emergency

Washington, Oct. 21—Mobilization of motor vehicles under government auspices has again established the essentiality of motor trucks. Government officials frankly admit their dependence upon this mode of transportation to stave off the effects of a railroad strike, which is regarded as almost a certainty.

Survey of motorized equipment owned or controlled by the government has been ordered by the Secretary of War. Plans drafted by the Council of National Defense are being studied with a view to revision to meet changed conditions.

As the crisis develops, all agencies, private and governmental, are inquiring into the number of trucks and other motor vehicles available and their location. There has been some talk of creating as an emergency position a Director of Traffic who would cooperate with various governmental agencies in getting motor vehicles to strategic points.

This method would force allocation of trucks to centers of population. However, no definite plans have been made up to this time, as governmental agencies are using all influence to bring about an amicable adjustment of the differences between the railroad operators and workers.

Statistics furnished MOTOR AGE today show that the War Department has available 31,529 motor vehicles of all sorts which are serviceable. These machines are located at army depots, posts and warehouses throughout the country and could be sent to various cities, whenever desired. These machines would be operated by the army personnel, and it is possible that some would be turned over to the Post Office Department for transportation of mails and foodstuffs.

Black & Decker

Baltimore, Oct. 21—The Black & Decker Mfg. Co. will be ready to make deliveries to jobbers by motor truck, east of Chicago. Believing that the necessary wider use of cars and trucks throughout the emergency would stimulate repair business, Black & Decker will assist jobbers in putting in sufficient stocks of their tool equipment to meet demand by guaranteeing protection against price reductions. The guarantee will cover possible reductions which might be effected next year.

Ohio Secure With 100,000 Trucks

Columbus, Oct. 21—Steps to mobilize motor trucks in Ohio have been taken

by the Ohio Association of Commercial Haulers, of which William H. Kutschbach of Columbus is president. Telegrams were sent by the president to secretaries of all local organizations in the state, asking them to list all motor trucks and secure data as to what proportion could be used to supply food stuffs and other necessities in case of a nation-wide railroad strike.

Kutschbach says that nearly 100,000 licenses to motor trucks were issued in Ohio this year and he believes that a large proportion could be employed in looking after the wants of the public in case of a transportation tie-up.

Kentucky Has 14,122 Trucks

Louisville, Oct. 21—Should the railroad strike be called, as threatened, Kentucky has 14,122 motor trucks to combat the trouble brought about by the cessation of train service. There are 3,000 large trucks in Kentucky, the remainder being of light capacity. The majority of the large cars are in cities. Mountain counties and counties where roads are poor are without any trucks. Six counties reported none within their borders.

Will Truck 75 Miles

Spartanburg, S. C., Oct. 21—With a general railroad strike threatened, Spartanburg wholesale produce men are looking to the truck as a solution of transportation to cities and towns within a radius of 50 to 75 miles.

California is Truck Wise

San Francisco, Oct. 21—In the event of a general railroad strike tying up all the rail lines in California, the State Railroad Commission is prepared to step in, take charge of all forms of transportation, and maintain distribution of food stuffs and other necessities of life within the state, according to announcement just made by Harley W. Brundige, president of the California State Railroad Commission.

"About 70 per cent of less-than-carload freight within a radius of 100 miles of San Francisco, Los Angeles, and other jobbing centers of California, is moved by truck," said Mr. Brundige, "and on a 50-mile radius basis the percentage is considerably larger. The truck lines, which are perfectly able to feed the cities, will also be able to handle large quantities of merchandise not produced in California, but which reach our seaports by water, so that we are situated in a particularly advantageous position, if the rail tie-up comes."

Pennsylvania Prepares For Strike

Philadelphia, Oct. 21—Gov. Sproul has ordered a quick survey of the resources of Pennsylvania, including the compilation of a list of available motor trucks that could be used to keep shipments of food, coal and other essential commodities moving, in case of the threatened railroad strike.

The governor also plans to call for a voluntary curtailment of the use of gasoline for non-essential driving in order that more may be available for freight transportation by truck.

The governor says that a way must be

found to keep transportation lines open between the cities and the rural parts of the state.

The adoption of a motor transport service to bring fuel, food and other necessities of life to the people in case of the strike, is being considered by the state administration. A revival of the "gasless Sunday" of war times is being considered.

Baltimore Truck Reserve Ready

Baltimore, Oct. 21—Because of the success which attended the operation of a large number of motor trucks during the outlaw railroad strike, the business men of Baltimore are not especially perturbed about the new strike threat. Many trucks always are in reserve here and a considerable number now are idle because of the industrial depression. Truck operators declare they have facilities to transport more food than the city can consume and leave a considerable tonnage for other work. It is estimated that there are at least 500 five-ton trucks in the city, and the number of smaller vehicles runs into the thousands. During the outlaw strike one firm carried 500 lbs. of fish to New York every night for a period of two weeks.

Call to New England Governors

Boston, Oct. 21—Mayor Peters has asked Governor Cox to call upon the states for a conference to work out a system of motor truck transportation to move staple food supplies in the event of a railroad strike. Mayor Peters pointed out that plans prepared by a committee appointed by him in 1919 "when a similar general railroad strike seemed impending," are still available as a working basis on which to operate.

Dealers' Cooperative Show Door to Future Business

Cleveland, Oct. 24—Cleveland dealers cooperated splendidly to make Enclosed Car Week a success, and they succeeded in awakening an interest in the event.

Prior to the opening of the week, the dealers sent out thousands of invitations to owners of cars, prospects and other persons with incomes sufficient to purchase cars.

The touring models were taken from the salesrooms and the enclosed types were given a complete monopoly of all exhibition space during the week. The visitors on the sales floors were above the number that came in the week before. Decorations were used in some instances. Sales during the week were largely of the enclosed models, although some touring cars were reported sold by dealers. The volume of sales, according to reports made by dealers, was about normal.

Dealers interviewed, without exception, say, however, that a good will for the enclosed car was created by the co-operative effort, and that its value is great. A great many prospects were made during the week, and everyone looks forward confidently to the future months.

Automotive Industry Ready to Run on Its Own Wheels

Railway Strike Will Not Hurt Automobile Business Excepting in Far Removed Points

(Continued from page 22)

factories find themselves fairly well stocked for taking care of November business. Factories with their own power plants are well stocked with coal in most instances, and the Detroit Edison Co., with its lesson of the last tie-up still fresh, has ample stocks for the winter months.

The cost of bringing in material by truck, where it will have to be resorted to—and the industry is resolved that no rail tie-up will interfere with its sales—will mean an extra burden in costs because of its exigency nature, but all costs will be absorbed to keep trade channels open.

If the strike is sustained for any great length of time, it is thought that another strong argument will be added to the advisability of utilizing motor trucks for all short haul work, and that many industrial houses will become permanent users of truck transportation in inter-city deliveries. A short strike, it is feared in some quarters, will result in a sudden boom for truck business, and then leave it flat before the trucks have had real opportunity for showing their potential value.

Should the strike occur, and should the railroads be able to keep their main routes open, it is thought likely that many of the roads may come into the truck market for vehicles to reach the points served by branch lines and smaller cities along the main routes. If the truck is once used for this work, there is a feeling that its success will find many roads formally adopting it for this service in the future.

One of the ill effects of a possible strike, from the industry's view, is that many companies struggling under the burden of liquidations, which have been kept going through the activities of creditors and friendly interests, may become despondent with the added responsibilities incident to a rail strike, and give up the struggle to reach again firm business footing.

On the whole, the industry takes the attitude that the government must take every possible means of preventing the strike, but should it occur it will not be unprepared.

The Detroit district can master 25,000 motor trucks for hauling food, fuel and other necessities should the rail strike become effective and remain in force long enough to deplete supplies. Action has already been taken by the Detroit Transportation Assn. to place their trucks in readiness for service of this kind and pledges have been given to hold rates at present levels. Similar action is being taken by truck associations throughout the state.

CONCERNING MEN YOU KNOW

H. H. Doehler, of the Doehler Die Castings Co., Brooklyn, is one of the speakers booked for the factory management class of the University of the City of Toledo this winter. Many officials of the Willys-Overland and allied automotive plants in Toledo are enrolled in the class.

Richard H. Magoon has joined the sales department of the Leach Biltwell Motor Car Co., Los Angeles. Magoon will assist Charles Hagenios, sales manager.

T. A. Heinold, for a number of years assistant manager and purchasing agent of the Miller Engine and Foundry Works, Los Angeles, has joined the Leach organization in the capacity of assistant purchasing agent. The Miller plant and organization was recently taken over by the Leach company.

Henry Farrington, widely known in the automotive industries as a sales executive, has accepted the position of sales manager of the Antigo (Wis.) Tractor Corp., manufacturing four-wheel-drive tractors, tractor appliances, etc. The company is now in production and making deliveries. It is owned entirely by local capital and Charles W. Fish, one of the largest lumber operators in the United States, is president.

Bart J. Ruddle, executive secretary and manager of the Milwaukee Automotive Dealers' Assn., was married to Miss Anna Marcan of Portland, Ore., July 2, but news of the event did not become known until last week when formal announcement was made at a dinner given by Mr. and Mrs. Ruddle. Ruddle has been secretary-manager since the Milwaukee dealers established their first organization as the Milwaukee Automobile Dealers' Association in 1908, and he has conducted every Milwaukee show given under the auspices of the association.

C. W. Coil, formerly with the Crow-Elkhart Automobile Co. and Harris F. Holland, connected with Napoleon Motors Co., have joined the W. A. Paterson Automobile Co. of Flint as general territorial representatives.

Homer McKee, formerly in charge of Cole sales and advertising, has been appointed advertising counsel to the Cole organization and will handle Cole advertising through the Homer McKee Advertising Co. of Indianapolis.

Charles S. Crawford, formerly chief engineer of the Cole Motor Car Co., has been named engineering consultant to the Cole organization.

R. G. Ewell, Columbus, O., has recently joined the sales organization of the Auburn Automobile Co., Auburn, Ind., as assistant sales manager in charge of merchandising and advertising.

Gibson Company Continues Automotive Equipment Plant

Indianapolis, Oct. 21—It was announced today that the Gibson Co. will discontinue within the near future the retail and wholesale distribution of Overland and Willys-Knight cars and will henceforth devote its entire attention to its automotive accessory and equipment business, which has grown to large national and international proportions. The Gibson Co. is one of the oldest automobile and accessory concerns in the country, having begun the distribution of Overlands and of automotive equipment in the early days of the industry, more than 23 years ago. Its Overland territory has been the largest of that of any distributor, while its automotive equipment and accessory business has covered more than half the country and has reached into practically every region of the world where motor cars are used.

J. M. Bloch, secretary and general manager of the company, said: "While the Willys-Overland Co. some time ago discontinued the services of most of its distributors, nevertheless a few have been retained, among them this company; and it was the desire of the Overland company to have us continue to represent it. Because, however, of the

Rudolph Hokanson, vice-president and general manager of the Nash Sales Co., Milwaukee, and his brother, Emil Hokanson, general manager of the Wisconsin Oakland Co., Milwaukee, returned home Oct. 11 from a four months' recreation tour of Europe.

H. F. Sundin, Milwaukee, formerly factory representative of the National, has become associated with the Koehler-Rahn Motor Co., Milwaukee, distributor of the National, Moon and Elgin Six in Wisconsin and Upper Michigan. Sundin will specialize in wholesale merchandising and the perfection of a service system at the Milwaukee headquarters, as well as among the dealers in this territory.

Richard P. Wilson has resigned as treasurer of the Batavia Rubber Co. of Batavia to become manager of Raymond W. Walker's automobile salesroom and service station at Batavia.

W. A. Sullivan, formerly sales representatives for Oldsmobile in Pennsylvania territory and before that advertising manager of Oakland Motor Car Co., Pontiac, has joined the staff of the Automobile Trade Directory in Detroit and Michigan territory.

Frank C. Vanderhoff has been appointed sales manager of the Ray Battery Co. of Ypsilanti, succeeding Wallace B. Blood who has resigned.

Dever Waters has joined the Schwarz Wheel Co., Philadelphia, as sales manager.

James Snoddy of Seattle was selected as the managing secretary of the newly consolidated associations—the Washington Automobile Chamber of Commerce and the Washington Automotive Trade Association, under the latter name.

R. A. Picard has been made general sales manager of the Metal Stamping Co., Long Island City.

S. H. Baker, formerly of Falk-Baker, Saxon distributor for New England, has joined Frank P. Allen selling Wills Sainte Claire cars.

F. H. Dolbeer, formerly treasurer of the Willys-Overland Co., Toledo, has been made traveling sales manager of the Victor Talking Machine Co., with headquarters at Camden, N. J. He was with this company before entering the automobile business.

W. W. Graville and Fred Dimler have been added to the sales force of the Tracy Motor Sales Co., Toledo distributor of Briscoe Motors. Graville was formerly with the Doan Motor Co., Studebaker dealers, and Dimler comes from Sturtevant-Jones Co., Marmon dealers.

Charles M. Strieby, Chicago, has recently been appointed assistant sales manager of the Auburn Automobile Co., Auburn, Ind.

growth of our automotive equipment and accessory business both in this country and abroad, we felt that in justice to this and to ourselves we should devote our entire organization and energy to the equipment and accessory end of our business."

In taking over the motor car distributing departments, the Willys-Overland Co. will pay cash to the Gibson Co. for its automobile and parts departments, and will conduct the business of the new Willys-Overland branch in the same building when it has been located. The Gibson Co. will also retain its same headquarters on the three upper floors of the five-story building it erected in 1916. General Sales Manager A. C. Barber of the Willys-Overland Co. announced that R. L. Butler will be branch manager.

DEALER WITHOUT ASSETS

Columbus, O., Oct. 24—Upon the application of G. M. Davis, who claims to be a creditor of the company, Judge Sowers has appointed W. A. Ashbrook receiver for the Cole Motor Sales Co., Columbus. After qualifying, Receiver Ashbrook could find no assets and advised that the company go into voluntary bankruptcy. The concern has a lease on a salesroom and service station, and distributed the Cole car in central Ohio.

Illinois Dealer Discovers Farmers Repairing Own Cars

"Home-Made" Service Is Practice of Recent Date and Will Return to Repairshops

CHICAGO, Oct. 24—A curious phase of the business depression among the agricultural interests was noted by a central Illinois motor car dealer, in which he said:

"I drove out into the country one day last week when the weather was too bad for farming. I stopped at a number of houses and every farmer upon whom I called was working on his automobile, truck or tractor. In years gone by, the man who attempted to do anything but the most minor repairs on his machine, was the exception, but this year, due to the lack of money among the men who till the soil, it is the rule. They will all come back to us sooner or later.

"The average motor vehicle owner is not sufficiently qualified or equipped to handle the intricacies of the car or tractor when serious trouble develops, and when they finally come to the garage man he must undo, in many instances, what the owner tried to do on the farm with limited knowledge and limited tools. I do not wish to convey the impression that the average motor car owner is not capable of making repairs or adjustments. In most instances, he has not given the subject sufficient attention or does not have the time. Until he does learn, it is wiser to let experts do the job," he concluded.

A. E. A. CAMPAIGN SPREADS

Chicago, Oct. 22—The merchandising campaign of the Automotive Equipment Association is being rapidly pushed in various sections of the country. Readings of Ray W. Sherman, Merchandising Director, to jobbers and jobber salesmen are being held virtually every week end, in this way taking personally to the trade the message of better merchandising, which is also being carried forward through the publications of the association.

On Oct. 14 and 15 Sherman addressed jobber salesmen in Boston, Worcester, Mass., Providence, R. I., and Hartford, Conn. On the 19th he was in St. Louis addressing jobber salesmen from the entire St. Louis territory who were in for the Fall Automobile Show. On the 21st he spoke in Lancaster and Philadelphia, Pa., and in Allentown and Scranton on the 22nd. Meetings in Chicago, Kansas City, Dallas, San Antonio, Houston, New Orleans and Memphis have been arranged for late October and early November.

SAVAGE TO BUILD IN CANADA

Detroit, Oct. 21—The Savage Automotive Co., incorporated in Toronto as the Canadian branch of the English company, has purchased a site in Sandwich, Ontario, for a factory and it is expected it will build a light car along the lines of the British product.

Automotive Repair Shop

Practical Maintenance Hints

Tool Etiquette

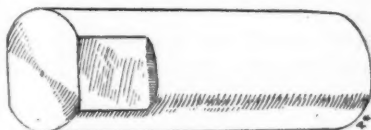
Not one man in twenty handles a monkeywrench as he should for effectiveness; there is a right and a wrong way, as shown.

To be sure, there is a tendency to spread the jaws of the wrench whichever way it is used, but in A this tendency is minimized, the greater part of the strain coming at the back end of the jaws, where they are sustained by the frame of the wrench. In B, however, the tendency is to spread the jaws, and instead of holding the nut firmly the jaws are opened, strained and permitted to slip over the edges of the nut and "round" them so it will be almost impossible to turn the nut with any sort of a wrench unless it is one of the pipe variety.

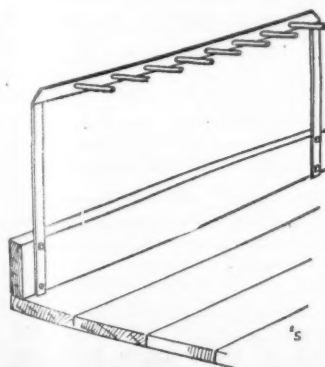
The way a Stillson wrench should be used is the exact way a monkeywrench should be treated. In the case of a Stillson, it would be inoperative if attempted as shown at B, whereas it will hold if turned as at A. Try a pipe wrench and see how it will and will not work, and then apply this practice with the monkeywrench.

Connecting-Rod Mandrel

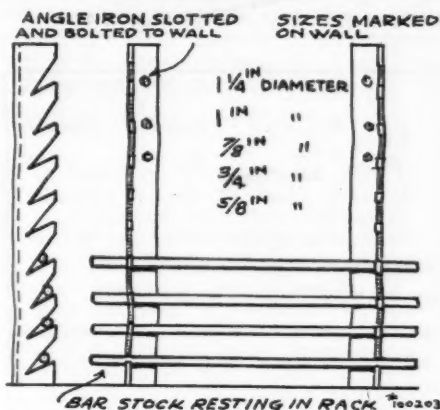
There are times when it is necessary to scrape a connecting-rod bearing, and when it would not pay to remove the crankshaft. Such a condition arises when a single bearing becomes badly scored so that it must be replaced or scraped. Under these circumstances the work may be quite satisfactorily done on a mandrel which is just the size of the crankpin. The mandrel should be flattened slightly at one end, so it may be held in a vise without difficulty.



Mandrel which is just the size of a connecting rod bearing



Rack for holding pistons removed from cars



Stock racks for shafts made from angle iron

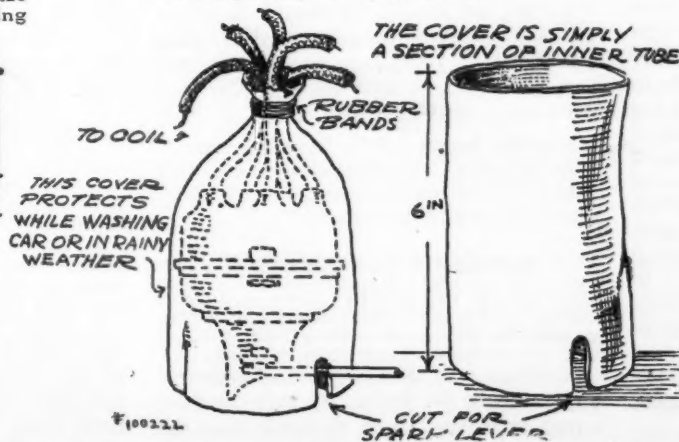
Improvised Cover Keeps Distributer Dry

Having many calls during wet weather from the owners of a certain make of car, an eastern service station manager, upon investigation, found that the distributor was drenched every time there was a heavy rain. Being of an inventive turn of mind, he improvised covers, such as illustrated, from sections of inner tubes. After installation, the upper end of the tube section is gathered tightly about wires and held in place by a number of rubber bands.

Stock Racks for Shafts Made from Angle Iron

Bar stock for shafts of various diameters can be conveniently stored on racks made from light angle iron, cut as shown in the attached drawing.

The advantage of this arrangement, apart from the cheapness and ruggedness of the racks, is that the stock can be marked for diameter with the dimension on the wall at the back of the rack. The arrangement is compact and practically any long parts, such as axles, drive-shafts, pipes, springs, etc., can be stored advantageously on these racks.



Distributor cover improvised from sections of inner tubes

Wooden Cylinder Protector

When a cylinder head is removed there is danger of carbon particles and other undesirable foreign matter dropping into the waterjackets. To prevent this, careful repairmen are beginning to use various means for covering or closing the holes. Some use wooden pegs, but a better method is to employ a wooden board about 1/2 in. thick. This board is roughly cut away to give access to the combustion chamber openings and holes must be drilled to allow the cylinder studs to pass through.

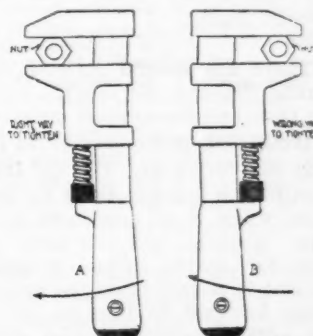
When this is put in place it closes up the waterjacket spaces and any stud holes which are open. A still better method is to take an old gasket designed for the particular engine in hand, and solder sheet metal over the waterjacket openings. Obviously, the advantage in using a gasket is that it is cut to fit, takes up little space and is easy to handle.

Piston Rack

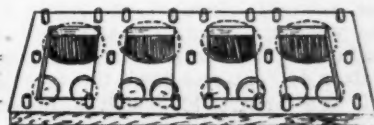
A rack for holding pistons when they are removed from the car not only protects them against accidental injury but also keeps the bench tidy. The one shown consists of a strip of bar stock bent to shape and having a row of pegs across the top to engage the wristpin holes. The pegs should be about 4 1/2 in. apart and there should be at least eight of them, preferably twelve.

Slipping Belts

If you are troubled with a belt that habitually seems too loose, try propping up the ceiling or rafters to which the countershaft is bolted. Sometimes the roof or ceiling sags and the countershaft sags also, producing a loose belt.



Right and wrong methods of using a monkey wrench



Wooden cylinder head cover

The Readers' Clearing House

Questions & Answers

CONDUCTED BY WILLIAM H. HUNT

DRAGGING, SLIPPING, CHATTERING CLUTCHES

Q—What must be done to stop the spinning and dragging of the clutch on the 1919 Jordan car?

2—How is chattering and grabbing of the 1921, 45 Buick clutch remedied?

3—Is it harmful to heat front axles to a dull red to take the twist and bend out of them?

4—What kind of a gage should be used when straightening front axles?

5—Would a Buick model 35 transmission, chassis and engine be strong enough to lengthen the frame and rebuild it into a one-ton truck using a Ford truck rear axle?

6—We would like to learn more about all kinds of bearings, wheels, motors and all others. Where can we procure this information?

7—We would also like to get information on all makes of clutches, their repair, care, etc.

8—What is the best way to line up the engine with the transmission in the Waterloo Boy tractor?

9—How can a burner for a stove be made to burn oil taken out of engines?

10—Are there any laws preventing people from putting up signs on highways?—A. B. Stuehm, Peotone, Ill.

1—The Borg & Beck clutch in the Jordan car is provided with a brake at the rear, as are all clutches of this make. Dragging may be caused by two things: too tight an adjustment of the clutch, or failure of the clutch brake action. When thrown completely out, the flange nut of the clutch throwout sleeve is brought up against the brake facing on the hub of the flywheel housing. If the facing is allowed to become covered with oil or grease it will not stop the spinning, and dragging will result. The remedy is to wash the brake thoroughly with gasoline.

2—The remedy for this trouble is to reface the clutch plate with genuine Raybestos lining.

3—No.

4—There are several methods used to determine whether or not the axles are true. One very successful concern uses a perfectly flat, steel face plate six feet long by two feet wide. The flat true surface will show up any twist or bends in an axle when it is laid upon it. Ford service stations use a very simple method for gaging axles. A length of chalk line is passed from the hole in one steering knuckle to that in the other. If the axle is true, the cord will pass across the exact centers of the spring perch holes. Still another method is to use straight edges at all points inside the webs and along the top and bottom surfaces. After all, it is very much a matter of "cut and try," the most skillful and expert blacksmiths depending upon the accuracy of their sight.

5—The chassis should give perfectly

The Readers' Clearing House

THIS department is conducted to assist Dealers, Service Stations, Garagemen and their Mechanics in the solution of their repair and service problems.

In addressing this department, readers are requested to give the firm name and address. Also state whether a permanent file of MOTOR AGE is kept, for many times inquiries of an identical nature have been asked by someone else and these are answered by reference to previous issues. MOTOR AGE reserves the right to answer the query by personal letter or through these columns.

Emergency inquiries will be replied to by letter or telegram.

Addresses of business firms will not be published in this department, but will be supplied by letter.

satisfactory service, if properly reinforced.

6 and 7—Books on the subjects may be procured from the U. P. C. Book Co., 239 W. 39th St., New York. We would also suggest that you apply to the bearing and clutch manufacturers. These concerns have been doing a valuable educational work during the last few years and have a mass of highly valuable instructive matter pertaining to their products.

8—This is rather a large order. The usual practice, when lining up engines and transmissions, is to bring the centers of the shafts into alignment. In this case the aligning will be vertical, as we fail to see how the units can be shifted horizontally in relation to each other. Either the transmission or engine can be raised by inserting shims under their supports.

9—The oil should be heated to about its flash point and atomized with a heavy air blast. Considerable experimentation will be necessary and we question that the results will be worth while.

10—We would advise you to consult your County Commissioners on this point. These matters are generally governed by local ordinances.

BOOKS ON CARBURETION

Q—Inform me whether there is a book giving carburetor information and where it may be procured.—The Strang Garage Co., Colorado Springs, Colo.

Gasoline and Kerosene Carburetors," Capt. Victor W. Page. It may be procured from the U. P. C. Book Co., 239 W. 39th St., New York.

INSTALLING THERMOID-HARDY UNIVERSALS ON OAKLAND CAR

Q—Can you inform me where we may procure the flexible type of universal joints shown in the accompanying sketch? This is the same type of joint that is used on the King eight car.

2—Is there any reason why they would not be successful if installed on a model 34 C Oakland car?

3—Where can they be procured?—N. C. Eickman, 329 Hopeland St., Dayton, O.

1—The joint shown in your sketch, (which has been returned to you) is known by the trade name of Thermoid-Hardy.

2—We know of no reason why it should not give perfect service on a 34 C Oakland, if it is properly installed. There will be considerable machine work and fitting necessary, which must be very carefully done.

3—This question is being replied to by mail.

HELICALLY CUT GEARS FOR STUDEBAKER REPLACEMENT

Q—One of our patrons who owns a series 18 Studebaker touring car wishes to know if a spiral gear can be installed in it in place of the present straight gear. If this is possible, where can such a gear be purchased?—Chas. H. Brown, Box 6, Twin Falls, Ida.

The replacement of the straight, spur-cut pinion and ring gears with those of the helically cut variety is entirely practicable. The name of the distributor of these gears is being supplied by mail.

CONVERTING A PASSENGER CAR FOR TRUCK PURPOSES

Q—Is it practicable to convert a model 83 Overland car into a good truck, using some one of the truck attachments now on the market?

2—Advise us of the addresses of the manufacturers of such units.—Grabb Bros., Lyndon Station, Wis.

1—Several models of Overland cars have been so converted with perfect success. We have no doubt that the model 83 will be equally successful.

2—The names and addresses of manufacturers are being forward to you by mail.

ELECTRIC STARTERS FOR FORD CARS

Q—Can you inform us whether there is a starter for the Ford car being manufactured?

2—If not, oblige us with the names of starters and generators which have given good service in the past?—Alfred Zehetner, 1315 11th St., Milwaukee, Wis.

1—Since an electric starter has been furnished as part of the stock equipment of the Ford car, most, if not all, of the manufacturers of these units have retired from the field. However, we are of the opinion that the apparatus can

still be procured from any of the companies which furnished them in the past. The names of some of these are as follows:

2—North East Electric Co., Dyneto Electric Corp., Gray & Davis, Inc., General Electric Co. The addresses of the foregoing concerns will be found in our advertising columns.

VALVE TIMING OF DUESENBERG-REVERE ENGINE

Q—Publish the valve timing, opening and closing in degrees, of the Duesenberg engine used in the late model Revere car.
—W. R. Ross, Avilla, Ind.

The only timing available is the opening of the intake valve and the closing of the exhaust valve. This is sufficient, as if the openings of one and the closing of the other is correct their other motions will also be correct. The intake valve opens seven degrees past top dead center. Exhaust valve closes eleven degrees past top dead center.

VALVE TIMING AND STEAM INJECTION

Q—What is gained by the early opening of exhaust valves? The Mercer 22-70, for instance, opens its exhaust 70 deg. before bottom dead center, making an exhaust stroke of 265 deg. Why the long stroke?

2—Would porting the cylinders of a Continental 3½x5¼ in. engine with ⅝-*in.* holes and adding a steam vaporizer, projecting into the ports and forming its steam from the radiator, increase the speed?

3.—Porting the cylinders allows an additional suction; therefore the suction stroke would reach its equilibrium near the bottom dead center, and a specially made camshaft, designed to close the intake valves at one-half their usual distance from bottom dead center, would give a longer compression stroke. The additional vapor from the steam injection would require an additional compression stroke, therefore a higher compression than usual. This would be another help for speed, would it not?—Albert G. Brucker, Post Field, Ft. Sill, care of Bal. Co. No. 23, Fort Sill, Okla.

1.—The engine in question is timed entirely too early. The correct timing is as follows: intake opens 10 deg. after top dead center and closes 46 deg. past bottom dead center; exhaust opens 48 deg. before bottom dead center and closes 20 deg. after top dead center. As there is a difference in the total time of opening of 5 deg. between your figures and the correct timing, we are of the impression that the valves of the engines in question are closing on top dead center. This would give a total opening of 250 deg. while the correct figures call for an opening of 248 deg. As you are probably aware, exhaust valves are opened early for the reason that the last part of the stroke has very little power value and it is better to sacrifice it in order to scavenge the exhaust gases as completely as possible.

2.—It has not been proven that injection of water or steam increases the speed or power of engines. This question indicates a state of confusion on your part. Compression pressures are not increased to take care of the additional water vapor, but the water vapor is added to retard flame propagation speed when high compression pressures are used.

3—Closing intake valves at a point

equal to one-half of their usual closing time would result in seriously handicapping any engine, for the reason that the full volume of gas could not get into the cylinders. As in the case of the early opening exhaust valves, the first few degrees of piston travel have very little compression value. In fact, the effect is so slight that the momentum of inrushing gases is sufficient to overcome it. It is the aim of designers to close the intake valve at the exact point where the compression equals the momentum of the inrushing mixture.

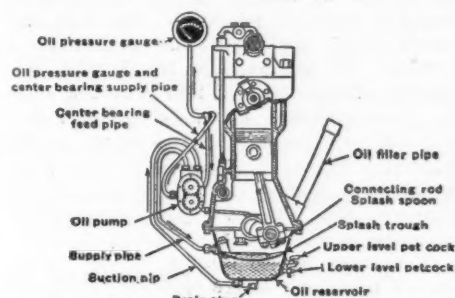


Fig. 1—Oiling system used on recent models of Chevrolet 490 models

CORD VS. FABRIC TIRES

Q—We would like your opinion on the following points:

A customer wants to know if it would be economical and efficient to use 30x3½ cord tires on a Dort touring car, instead of 31x4 in. fabric tires. He has been told that a 31x4 fabric tire will give longer mileage and easier riding than a 30x3½ fabric tire, because of the difference in diameter and wearing surface. The car at the present time is equipped with 30x3½ fabric tires. He is contemplating a change and wants to be sure that he is right before making it.—Carl Wm. Frank, 2921 18th Ave. So., Minneapolis, Minn.

We should recommend the 30x3½ cord tires. It is quite true that the 31x4 fabric tires would give longer mileage and a trifle easier riding than the 30x3½ in. fabric type. However, the 30x3½ in. cord is an oversize as compared to the fabric tire of the same dimensions and closely approximates the size of the 31x4 fabric tire. For this reason it should give as easy riding as the latter and has the further advantage of the much more sturdy cord construction.

CALCULATION OF PISTON DISPLACEMENT

Q—What is meant by the term piston displacement?

2—How is it calculated?

3—The oil pump on a 490 Chevrolet does not pump enough oil. The gage does not show any pressure and the cylinders seem dry. The old oil was drained out and the engine was flushed out with kerosene, but that didn't seem to help any. What can be done with the pump?

4—Will it harm the ignition coil if the car is run with the resistance unit removed? Would it be satisfactory to substitute a piece of wire for the resistance unit? The coil is a Remy.—M. J. R., Omaha, Nebr.

1—Piston displacement is the cubical contents of the space swept by the pistons; thus, a four-cylinder engine with a 3 in. bore and a 5 in. stroke has a displacement of 141.4 cu. in.

2—The formula for the calculation of displacement is $D^3 \times .7854 \times S \times N$. D is the bore in inches, S the stroke in inches and N the number of cylinders. Thus

for the engine mentioned we have
 $3 \times 3 \times .7854 \times 5 \times 4$ or 141.4 cu. in.

3—You do not mention the year model of the Chevrolet engine, so we assume that it is one of the later models. If this is correct, the illustration, Fig. 1, shows the path of the oil clearly. We believe it likely that the trouble is due to wear in the pump. If this is the fact, it can be remedied by installing new gears. Before this is done, the suction pipe should be removed and tested for leaks. In replacing it, be very certain that the couplings at the top and bottom are absolutely air-tight. It sometimes happens that the pump becomes airbound and needs priming. This can be accomplished by disconnecting the upper end of the supply pipe and filling the pump full of oil with an oil gun. The coupling must then be made promptly and the engine started.

Other causes which render the system inoperative are sediment in the crankcase or dirt and lint in unstrained oil. We would recommend that you disassemble the whole system and give it a thorough cleaning.

4—No. The resistance is installed to protect the coil in case the switch is left on with the engine at rest. It is true that the automatic ignition switch operates to open the circuit within about 30 seconds after the engine has come to rest, but the resistance unit is a supplementary protection. It will not be necessary to use the length of wire, as suggested. If the resistance unit is burned out, you may make your connection directly to the center bolt which holds it in place. This has the effect of cutting it out entirely and making a connection directly with the primary winding of the coil.

While the foregoing may be done in an emergency, we strongly recommend that the faulty resistance unit be replaced with another one as soon as convenient, for the reason that sooner or later you will forget to turn off the ignition switch. In this event, if the automatic switch fails to operate, the result will be a damaged coil.

CONVERTING A 6-46 PAIGE INTO A SPORT SPEEDSTER

Q—In your opinion could a C-2 Continental engine used in the 6-46 Paige car be bored out to 3½ in.?

2—Could DeLux pistons be used?

3—What would be a good real axle ratio for this car with a sport body mounted and 33x5 in. tires?

4—At what speed does this engine develop its maximum power?—Leon Martin, 606 Texas St., Vernon, Tex.

1-Inasmuch as this engine is a 3½ in. bore and it would be necessary to remove a total of ⅛ in. of metal, 1-16 in. from the cylinder wall all round, we recommend that the job be not attempted, for the reason that, in our opinion, it would weaken the cylinder walls too much. If refinishing is necessary we recommend that it be done by grinding, not over .010 in. to be removed.

2—These pistons should give perfectly satisfactory service, if properly fitted.

4—The dynamometer test of this engine shows that it develops 50 hp. at 2000 r.p.m. when in normal condition.

CARBURETER ADJUSTMENTS

Adjusting Ball & Ball Carbureter

LUBRICATION SYSTEM AND CARBURETER OF OLDSMOBILE 45B

Q—An Oldsmobile 1920 eight-cylinder car, upon which we are working, is over-lubricating badly. Can the pressure be let down to eight or ten pounds without damage to the engine?

2—Can baffle plates be put into the bottoms of the cylinder of the right-hand block to stop the oil, and will any damage be done if they are installed?

3—The Ball & Ball carbureter on this engine has been taken apart to clean and we are somewhat confused regarding the assembly. Will you inform us if the small nozzles belong to the low-speed chamber or to the high-speed chamber. The way it is now set, the small nozzles are in the low-speed chamber and the No. 70 nozzles in the high-speed chamber. Is this correct?—A. D. Stuehm, Peotone, Ill.

1—From your description we should say that the lubrication system of this car is functioning perfectly. Oldsmobile service stations adjust the pressure from a minimum of five pounds with the engine idling to a maximum of 15 pounds at high car speed. The factory recommends a higher pressure than this—even up to 25 pounds. The pressure is regulated by means of a regulating valve located at the front of the engine on the left side. The circulation system is illustrated in Fig. 2. Screwing the valve to the right, or inward, raises the pressure, while screwing it to the left, or outward, lowers it.

We believe you will do well to check the fit of the connecting rod bearing before altering the pressure of the oil. As the bearings wear, they offer a low resistance path for the oil, which pours through them in a flood. The secondary effect of this is that the oil is thrown from the connecting rods and crank pins in a greater volume than was originally intended. This, of course, results in over-oiling and all the evils attendant upon it.

2—We strongly advise that the baffle plates be not installed.

3—The illustration in Fig. 3 will assist in understanding the following

explanation of the construction and adjustment of the Ball & Ball carbureter:

Passage No. 1 is the air duct of the primary carbureter containing the choke valve No. 2; No. 3 is the primary venturi throat connecting the main air passage with the mixing chamber, No. 6, as shown by dotted lines, and containing the gasoline jet No. 4; No. 5 is another fixed air regulating orifice connecting the air passage No. 1 with the mixing chamber No. 6, and provided with a spring-opposed idling valve No. 7 arranged to control the air when small particles only are being used; No. 8 is a throttle valve of the conventional butterfly type. These parts comprise the primary or first stage of the carbureter.

Referring again to Fig. 3: No. 9 is an air passage leading from the external air to the mixing chamber (6). It contains the butterfly valve (10), arranged to control the flow of air through this passage. No. 11 is a gasoline jet arranged to discharge gasoline into the passage (9) when the valve (10) is opened, causing the gasoline jet (11) to be acted on by the suction in the mixing chamber (6). The air passage (9) with the gasoline jet (11) constitute the second stage, which is brought into action by opening the butterfly valve (10). A connection between the butterfly valve (10) and the throttle valve (8) (not shown) is so arranged that when the throttle valve (8) is nearly wide open, any further movement has the effect of opening the valve (10) to its full capacity. At all other times the valve (10) is held close by a spring (not shown).

From the foregoing description it will be seen that under all the usual running conditions of the engine, the primary or first stage only of the carbureter is in service, and that the second stage comes into service only when the throttle is thrown wide open for full power. The effect of this arrangement will be described later on.

A cylindrical chamber (12) with an

extension (13) of reduced diameter is connected with that part of the chamber (15) above the butterfly throttle by means of the angular passage (14). The chamber (12) is connected with the float chamber (16) by means of the restricted passage (17) so that the gasoline is at all times in this chamber (12) and stands on a level with that in the float chamber. No. 18 is a loosely fitting plunger with an extension (19) on its upper end, forming a piston in the chamber (13). At an atmospheric opening No. 20 is located in the wall chamber (12) and a passage (21) leads from the chamber (12) to the mixing chamber (6), through which passage air is constantly drawn into the latter chamber.

It will be seen that in the operation of the engine, when the throttle is closed, the vacuum of the manifold, acting on the piston (19) causes the plunger (18) to rise to its upper position, thus closing the passage to the chamber (15). The space below the plunger (18) is now filled with gasoline from the float chamber, and the mechanism is ready for action. The opening of the throttle (8) breaks the vacuum in chamber (15) and releases the plunger (18), which falls and misplaces the gasoline underneath the plunger, causing it to flow into the space above the plunger, where it is quickly discharged through the passage (21) to the mixing chamber, thus augmenting the normal supply of gasoline and causing a rich mixture to momentarily enter the cylinder. This develops a strong pick-up.

After the foregoing description, the following directions for the adjustment of the carbureter will be readily understood. It will be apparent that improper operation, providing the carbureter was correctly adjusted in the first place, will be caused by dirt in some of the parts or by an inexperienced attempt at adjustment. If the car accelerates properly in the primary stage, but loses speed, misses, and generally acts badly when the throttle is opened wide so that the secondary nozzle (1) comes into effect by the opening of the throttle valve (10), then the difficulty concerns only the secondary stage, as until the arm on the outside of the carbureter opens the sec-

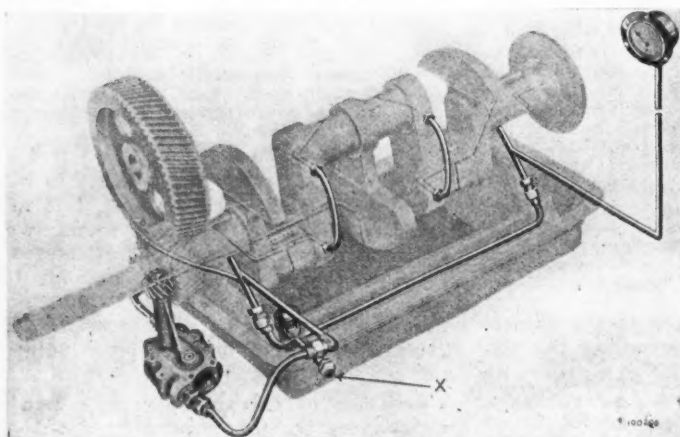


Fig. 2—Skeleton view of the lubrication system of the 1920 Oldsmobile. Pressure adjustment is made at the valve marked X

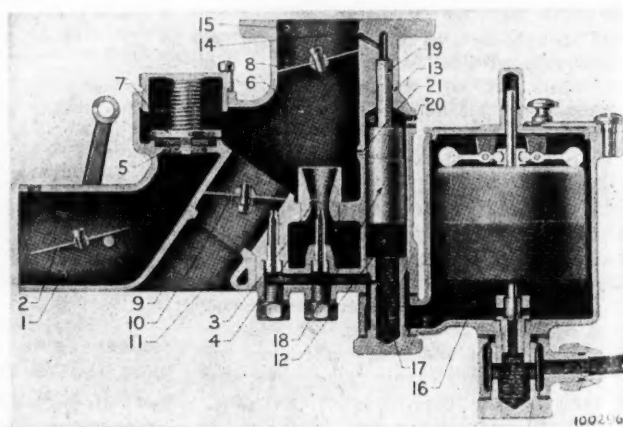


Fig. 3—This cutaway section of the Ball and Ball carbureter used on the Oldsmobile, 1920 model, shows the air arrangement of the nozzles and the flow of the fuel

ondary throttle (10), that stage is completely out of action.

Then remove the carbureter and unscrew the plugs beneath the nozzle; also remove the numbered adjustment screws on the side of the carbureter and clean all parts thoroughly. If the engine fails to idle, first remove the two adjustable caps and see that the air valves are free on their stems and also that the seats are clean. Back off or turn the air valve cap counter clockwise until the engine ceases to fire. Adjust the throttle stop screw and air valve cap nearest the right cylinder block until the engine runs at the slowest possible speed without "rolling or loping."

After the adjustment of the right-hand valve is completed, return the left-hand air valve cap to such position as will make the eight cylinders fire evenly. Run engine at good speed for a few seconds and then throttle down. Engine

Adjustment of Model M Rayfield Carbureter

Q—We have a Haynes model 36 which is giving us trouble. The valves have been ground and the engine has good compression. The Rayfield carbureter can be adjusted so that the engine runs well at high speed but will not idle, or it can be adjusted for idling, but will not pull well at high speed. This carbureter has been cleaned and adjusted by several mechanics. What do you recommend?—C. A. Tryon, Martin Motor Co., Stoutland, Mo.

Before attempting to adjust the carbureter, be sure that there are no obstructions in the gasoline line; that connections are absolutely tight and free from air leaks; that valves and ignition are properly timed and that there is a hot spark and good compression in all cylinders. These are stock instructions and apply to any carbureter (Fig. 4).

This model M carbureter has two adjustments, one for low speed and one for intermediate and high speed. These adjustments cannot change after having once been set, as they are positively locked. The low speed adjustment (A) should be turned to the right or left, as required, until the engine runs properly at low speed. Allow the engine to become thoroughly heated, then make final adjustments by turning the low speed screw to the left until the engine slows down; then to the right a notch at a time until the engine idles smoothly.

This model M carbureter has two adjustments (C) and is made accessible by removing the hot air elbow from over the main air valve. Do not move the high speed screw more than one-eighth of a turn at a time. Turn it to the right for a richer and to the left for a leaner mixture. This setting, being very effective, will greatly determine the fuel economy; therefore, make sure it is set as lean as possible, though still retaining good acceleration. No amount of adjusting will remedy matters if the moving parts of the carbureter are worn.

The throttle valve stems should be examined for wear, as well as the small, hardened steel cams of the low speed adjustment. We suspect that you have

will "lope," "roll" or run too fast. If this occurs, adjust the throttle stop screw until the engine idles at desired speed.

Usually it is necessary to adjust both air valve caps two or three "clicks" leaner, or, in other words, unscrew, which adjustment will correct the "loping" or "roll." It is possible, however, that a slightly richer mixture is required in some cases. The above adjustments are necessarily made with the spark retarded.

It is quite apparent that you have this carbureter assembled wrong. The small nozzles (No. 70 or 71) are the low-speed nozzles and should be screwed into the orifice of the primary venturi throat (3). The No. 56 or 57 nozzle is the high-speed and should be screwed into the orifice (11). With the nozzles installed in their proper location, we believe you will have no further trouble in adjusting this carbureter to operate satisfactorily.

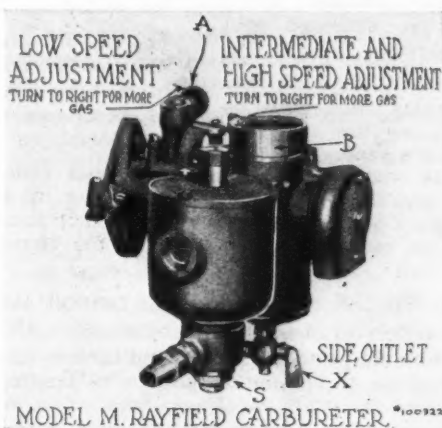


Fig. 4—Model M Rayfield carbureter used on the model 36, type T Haynes, showing points of adjustment

tried to adjust this carbureter too rapidly. The adjustments are very delicate, as may be surmised from the foregoing instructions, and the best results will be obtained by moving them one notch at a time, driving the car at least one-half mile between alterations.

LEAKY RINGS, AIRPLANES, STEAM CARS AND OTHER THINGS

Q—Is the Reese Aero car built at present? If so, give the manufacturer's address.

2—Publish the gear ratios of the 1917-18-19-20 and 21 Buick four and six-cylinder cars.

3—What is the cause of oil pumping in a Ford when the cylinders have recently been ground and fitted with new pistons and rings? How can it be remedied?

4—Can steam cars be admitted in national automobile races?

5—From a financial standpoint is high or low grade oil the best to use in an engine of low temperature?

6—Why are airplanes speedier than racing cars?—Arthur Nelson, Box 20, Route 4, Cherokee, Ia.

1—The Reese Aero car is manufactured by The Sheldon F. Reese Co., Huron, S. D.

2—Gear ratios of Buick cars: 1917 four-cylinder, 4.08-1; six-cylinder, 4.08-1; 1918 four-cylinder, 4.08-1; six-cylinder,

4.08-1, and six-cylinder, 4.61-1; 1919 six-cylinder, 4.07-1; 1920 six-cylinder, 4.00-1; 1921 six-cylinder, 4.08-1.

3—Nothing other than poor piston and ring fit can account for the pumping action. The only remedy is the correct fitting of the pistons and rings.

4—There are no provisions in the A. A. A. rules for competition between gasoline and steam engined cars. The two types differ so radically in performance that it has never been possible to formulate rules which would be fair to both of them.

5—As a general principle; the better grade of anything is the most economical to use. The rule applies in this case.

6—It is entirely a question of power. If cars were powered as high as airplanes and had a perfectly smooth surface to run on we are under the impression that they could defend their rights to the title of Speed King in a most decisive manner. It must be remembered that most of the latter day racing cars are limited to a piston displacement of 183 cu. in. and that this rule does not apply to airplanes. If you will consult the records of airplane performance you will find it is not at all unusual for a plane to be powered with an engine of 400 hp. or more.

MAXIMUM POWER AND SPEED OF CHEVROLET MODEL D ENGINE

Q—What is the maximum r.p.m. and power of the model 8 Chevrolet model D engine?—James C. Jackson, Jacksonville, Fla.

The S. A. E. rating of this engine was 360.5, but the manufacturers advise us that it developed 50 hp. at 2000 r.p.m.

VARIOUS EXPEDIENTS FOR SPEEDING UP STOCK CARS

Q—We would like some information regarding the different devices used in increasing the speed of stock cars; also on 16 valve heads for four-cylinder cars.—Chickasha Auto Top & Painting Co., Chickasha, Okla.

We are somewhat at a loss to know just what information you desire. Among the devices which speed up stock engines are: eight and 16-valve heads for Ford and Dodge Brothers cars; light weight iron and aluminum pistons and connecting rods; counterbalances for crankshafts; special carbureters and manifolds and the like. These parts are produced in quantities for Ford and Dodge Brothers cars by several concerns, the name of a few of which we are forwarding by mail.

RACING CAR SPECIFICATIONS

Q—What make of wire wheels were used on the racing cars in the 1921 Indianapolis race?

2—What make of radiators were used?

3—Publish specifications of the Duesenberg car.—S. L. Medill, Jaroso, Colo.

1—All the cars with the exception of De Palma's Ballot and Corum's Frontenac Special were equipped with Rudge-Whitworth wheels. The first had Standard Roller Bearing equipment and the last Distel.

2—This information is not available.

3—Engine, eight-cylinder; bore, 2 7/8 in.; stroke, 5 in.; lubrication, pressure; starting and lighting, Delco; wheelbase, 134 in.; weight, 3100 lbs.; tires, 34 by 4 1/2 cord; brakes, hydraulic, all four wheels.

ENTZ ELECTRIC SYSTEM FAILS TO CHARGE BATTERY

Q—We have a customer who owns a Chalmers car equipped with the Entz system. We sold him a new battery and it has been giving him good service until about a month ago and now we cannot keep the 12-volt side charged. The 6-volt side will always show about 1.280 with the hydrometer, and the balance of the battery will read only about 1.100. When we put an ammeter in the circuit it shows a charging current of about 7 amp., and the voltage across the terminals of the generator will only be 20½ volts. We have gone all over it and put in new wire and cannot find any leaks. We do not believe that the generator is producing enough voltage to keep the battery up; that is, we doubt that the voltage of the generator overcomes the battery voltage enough to charge it. What do you think?

—J. A. Wynes, Wynes Exide Battery Service, 1101 5th Ave., Moline, Ill.

It is difficult to answer this sort of a question for the reason that the system, not of the simplest in the beginning, is so old that it may have been rearranged many times by electricians or mechanics of questionable ability. That the generator is doing its duty we believe, as, if it were otherwise, it would not show a voltage reading of 20½ nor an output of seven amperes. This rate is quite correct for the 18 volt, 50 ampere hour battery used.

One very good method of checking the generator is to disconnect the driving mechanism at the rear universal joint, and count its speed as a motor. With the battery fully charged it should motor freely at 100 r. p. m., or thereabout. Refer to the diagrams in Figs. 5 and 6. That shown in Fig. 5 is of the generating circuits only and the wires to the dash lamp inspection receptacle and lighting switch are to be ignored. That shown in Fig. 6 is a simplified diagram of the internal circuits of the motor generator. The wire from the six-volt terminal of the battery to terminal No. 4 of the motor generator is purposely left disconnected to avoid confusion. This generator is what is known as a com-

pound wound and the regulation is accomplished by means of the series field winding.

When running as a motor, the path of the current is that shown by the heavy arrows, and, when generating, the current path is that shown by the dotted arrows. It will be seen that, when motoring, current flows through both the series and shunt fields in the same direction, so that they act as one field. This is what is known as cumulative compounding. However, when generating, the current flows through the series field in the reverse direction, although still flowing through the shunt field in the same direction as when the unit acts as a generator. This is what is known as differential compounding, the series fields setting up a bucking effect and tending to neutralize the magnetism generated by the shunt field.

To test the series field, connect the battery to positive (P) and negative (N) binding posts, as shown, and then bridge across from binding post A to binding post 2. This will have the effect of causing the unit to run as a plain series wound motor and it will develop considerable speed. With the bridging wire still in place, connect terminal No. 2 and terminal No. 3. This should have the

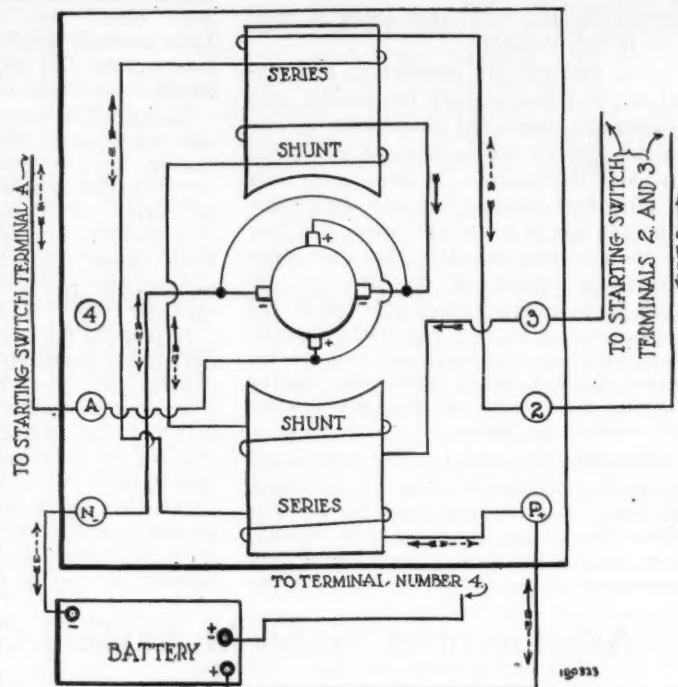


Fig. 6—Internal circuits of the Entz motor-generator used on the models 24 and 26 Chalmers cars. Connecting terminals A, 2 and 3 together causes the apparatus to act as a cumulative compound motor or a differential compound generator

effect of immediately slowing the motor down to 100 r. p. m. or thereabouts and also causing it to develop increased power.

Now remove the bridging wire and connect positive terminal (P) to binding post No. 3. The machine will now run as a series wound motor, but the current will be passing through the shunt instead of the series fields. If it motors all three ways it may be considered as being in good condition. We take it for granted that the brushes and commutator have been examined, undercutting the insulation of the latter and dressing it, if it was necessary. We believe these parts to be in good condition, as if it were otherwise the machine would not be delivering 20½ volts and seven amperes.

We suggest that you again go over the system carefully, checking all connections and, if they are wrong, reconnecting them according to the two diagrams. If this does not remedy the trouble and there are no short circuits or grounds in the system, the fault lies with your battery. It is quite possible that some genius in rearranging this system has wired it so that 12-volt bulbs are being burned from the 12-volt side of the battery. If this is the case, the wiring should be changed back to the original plan and the 6-8 volt bulbs used.

ACID SOLDERING SOLUTION NOT THE BEST

When soldering electrical connections that are to be taped in, it is better to use a non-acid paste as a flux. If acid is used it will sooner or later attack the metal and result in a poor connection, which will be difficult to find on account of being hidden under the tape.

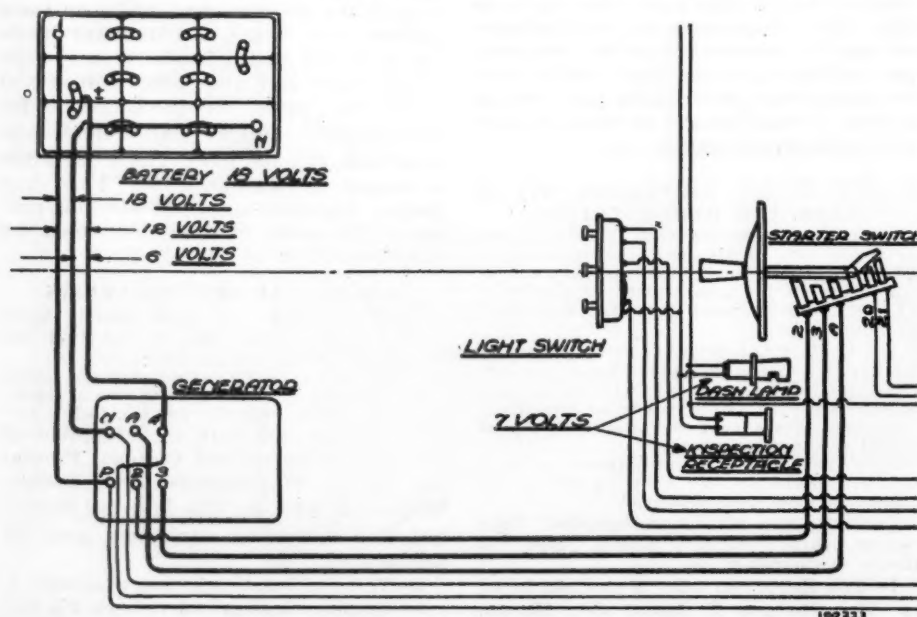


Fig. 5—Generating and charging circuits of the Entz system used on the models 24 and 26 Chalmers cars. All leads except those shown by the heavy lines are to be disregarded

METHOD OF WIRING DIXIE MAGNETO FOR BATTERY

In your issue of Aug. 18, you show a Dixie magneto wired into the battery circuit for easy starting, using a three point switch. We would like to suggest the arrangement shown in the accompanying illustration (Fig. 8.) Instead of being run directly from the battery, the wire to the magneto is run from the starting motor side of the starting switch. By this arrangement current is supplied to the magneto when the starting switch is closed. It also eliminates the necessity for the three point switch, as the regular Dixie switch can be used for grounding.—Pethick Bros. & Shearer, Shoshone, Ida.

There is no reason why this arrangement should not work, other than that the long path for the current around to the starting switch and then through the starting motor might offer too much resistance for the magneto primary current to overcome. One the other hand, these conductors are all large and the resistance may be negligible. It is an easy and inexpensive expedient to try.

NORTH EAST STARTER GENERATOR ON 1913 MICHIGAN

Q—Publish internal wiring diagram of the North East starter generator used on the model 40 Michigan.

2—Can an ammeter be substituted in place of the C. O. D. indicator originally supplied with this system?—Joseph J. Zitek, Alexander, N. D.

1—See Fig. 7. This apparatus is designated as the model A, type 1000 or 2000. The earlier models were supplied with the polarized type of master relay shown at A. This device was later superseded by the relay shown at B. The connections of the two are identical. The polarized relay was characterized by a semi-circular permanent magnet, from which it derived its name. The later relay was simply an electro-magnetic

instrument. The regulating resistance unit is in the form of a flat coil, mica insulated, which surrounds the armature shaft and is located just under the relay.

2—A specially constructed ammeter can be substituted for the C. O. D. indicator, the connections being the same. Do not attempt to install the conventional type of ammeter, as it will be burned out the first time the starter is used, for the reason that all of the current for the starter passes through the indicator. An instrument designed to withstand the heavy discharges and still indicate the value of the charging current correctly is manufactured by the Roller-Smith Co.

CONTEMPLATING STARTING AN ELECTRIC SERVICE STATION

Q—We intend to install an electric repair department and would like to know if there is anything published that would tell us how to make a growler, magnet charger and other testing apparatus? Would you recommend making these devices or purchasing these, as well as a fully equipped test bench?—Downs Garage, Waco, Tex.

Full instructions for the making of magnet chargers and growlers have been published in *MOTOR AGE* repeatedly. As we have stated many times, we recommend that these instruments, as well as meters and test benches, be purchased.

GENERATOR DATA OF OVERLAND

Q—Publish a winding diagram of the generator armature of the Overland 4 car.

—C. K. Tashima, Ellis, Kan.

This winding diagram is not available. The generator is the model G-K. It has 17 slots, 33 segments and is wound with No. 17 wire.

REPAIRING CYLINDERS BY THE SILVER NICKEL ALLOY PROCESS

Q—Advise by mail or publish in *MOTOR AGE* how a cracked cylinder can be repaired by the silver nickel alloy process.—Lewis A. Cantern, Springfield, Mo.

There are two processes of repairing cracks and scores in cylinders by filling them with a silver nickel or other alloy. Both of these processes are secret and are leased to representatives by the concerns which control them. Names of concerns are being supplied by mail.

SUBSTITUTION OF REGULATING RELAY ON MAXWELL

In our reply to Mr. Fred Hartman of Albert, Tucker County, W. Va., in the issue of July 7, we stated that the Ward-Leonard controller could be purchased from the Wagner Electric Mfg. Co., of St. Louis. This should have read The Wagner Specialties Co., 1902 Broadway, New York. Ward-Leonard products can also be produced from the Ward-Leonard Electric Co., Mt. Vernon, N. Y.

SPEEDS OF BUICK CARS

Q—What is the speed of a 1916 Buick 6 roadster, model D44?

2—Of a 1915 Buick 4 roadster, model C36?

3—Which one is the faster?—E. C. Langstien, Rockford, Ill.

1, 2 and 3—According to the claims of the manufacturer, both cars will attain a speed of about 55 m.p.h.

BOOKS ON AUTOMOBILE PAINTING

Q—Can you recommend a good book on automobile painting?—E. Nielsen, Brooklyn, N. Y.

The following books deal with the subject quite completely: "Automobile Painting," by F. N. Vanderwalker, and "Modern Painters Encyclopaedia," by F. Maire. Both of these books may be procured from the U. P. C. Book Co., 239 W. 39th St., New York.

Fig. 7—Right—Internal circuits of Model A. North East motor-generator number 1,000 or 2,000, used on 1913 Michigan 40 and several other cars of the period. Left—Simple electro-magnetic master relay which was later superseded by the polarized type shown at right. The connections of the two devices are identical

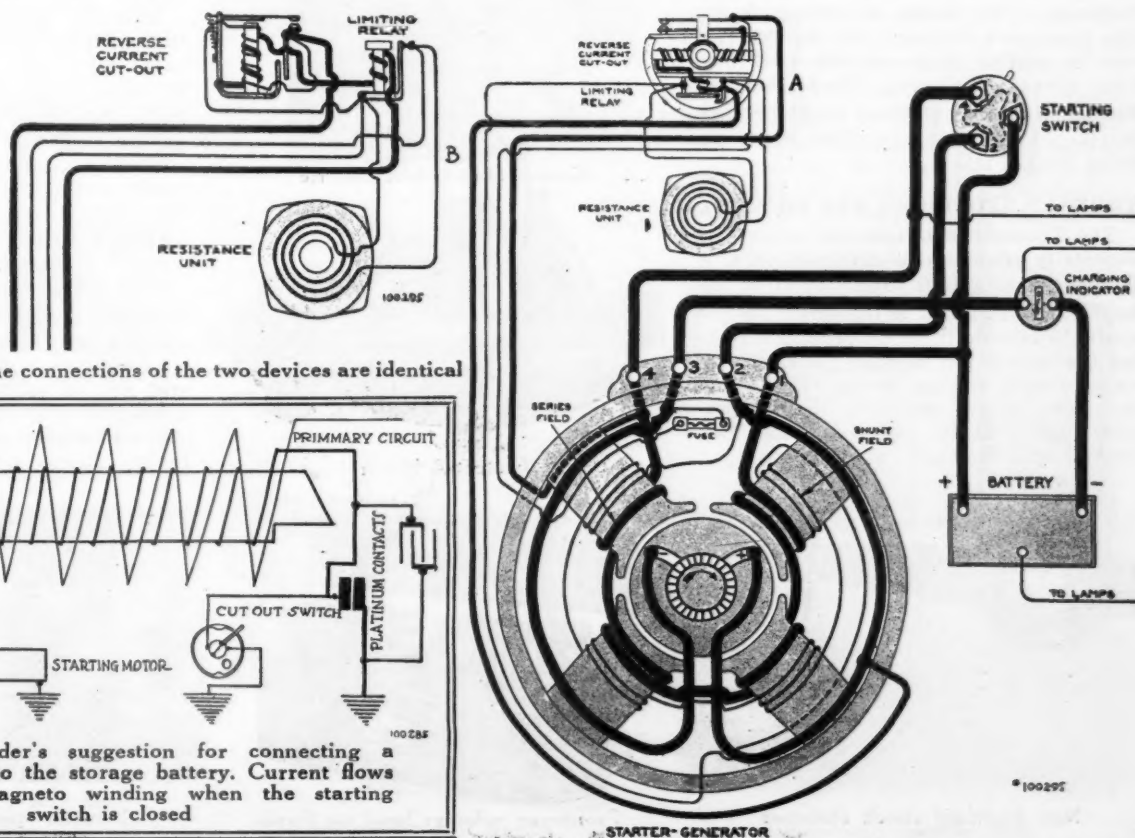


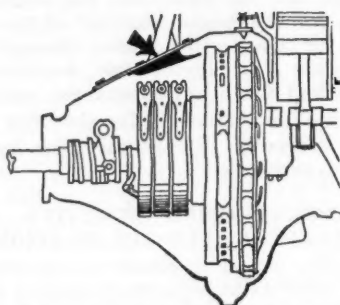
Fig. 8—A reader's suggestion for connecting a Dixie magneto to the storage battery. Current flows through the magneto winding when the starting switch is closed

The Accessory Show Case

New Fitments for the Car

DASH GASOLINE GAGE CALLED PETROMETER

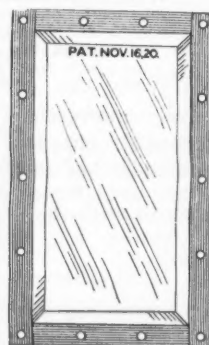
The Petrometer shows from the dash the amount of gasoline in the tank. It is connected to the tank by a small hollow wire which extends in enlarged form to the bottom of the tank through a special fitting at the top. When the tank is filled, it enters the bottom of the tank tube, compressing the air in it, which compression transmitted through the hollow wire, is registered by a red fluid in a glass gage on the dash. Price \$5. Porter Electric Carbureter, Inc., Knickerbocker Bldg., New York.



Yale transmission band oiler



Petrometer



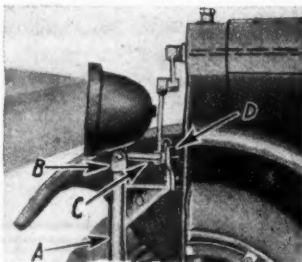
Replacement curtain lights

NEW MODEL HARTFORD SHOCK ABSORBER

A new model Hartford shock absorber has been placed on the market, following the basic principles of the previous design, but having a tubular drag link connecting the arm of the shock absorber with the axle. Ball sockets at each allow free play. When the wheels hit a bump, the arm moves up, controlling the violent action of the up-throw and easing the reaction of the springs. Price \$35 per set of four. Edward V. Hartford, Inc., New York City.

REPLACEMENTS LIGHTS FOR CURTAINS

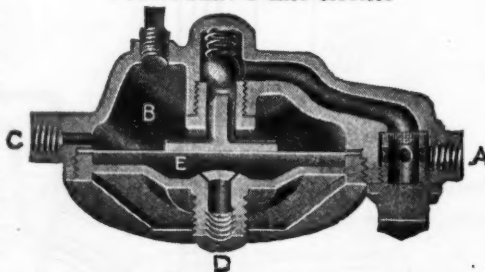
A line of replacement lights for Ford and Dodge curtains is now being manufactured. The model illustrated is for the Ford back curtains, 1917 to 1921. It can be applied to the curtain with fourteen nickel fasteners. The lights are furnished in sets of three at \$3 per set. Replace Light Mfg. Co., 2308 Sixth st., Rock Island, Ill.



Gauntt Shift-O-Lite electric

THOMSON SPOTLIGHT AND CONTROL

The Thomson spotlight and control is especially adaptable to enclosed cars. A flexible housing tube extending from the handle, within reach of the driver, to the spotlight outside the body permits directing the rays to any desired place. It has an automatic locking device which holds the light in any position. Price complete, \$20. S. H. Thomson Mfg. Co., Fourth and St. Clair st., Dayton, O.



Protect-A-Motor

WILLIS-WARNER PROTECT-A-MOTOR

The Protect-A-Motor is an automatically controlled valve which is installed in the fuel line near the carburetor, the fuel passing through it. The fuel cut-off valve is automatically controlled by the action of the oil pump. Should the supply of lubricating oil become exhausted or the oil pump fail to function, the valve immediately closes, shutting off the fuel supply to the carburetor, and stopping the motor.

The fuel enters at A, through ball valve into supply chamber B, and out at C to the carburetor. The oil pressure enters at D, and against diaphragm, E, causing the valve to remain open as long as there is oil pressure. There is always sufficient fuel in the carburetor, fuel line and supply chamber to run the motor until oil pressure opens the ball check valve. Willis-Warner Mfg. Co., Kansas, Mo.

FRONTENAC CYLINDER HEAD

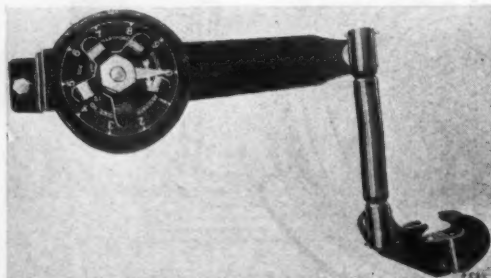
This is a special cylinder head for Fords with overhead valves designed to give more power and speed. It has a high velocity manifold that fits any one-inch carburetor. A cover protects the overhead valve mechanism from dust and dirt. Made in three models: Model T, \$100; model S for speedsters, \$100; model 3 for racing purposes, \$110. Chevrolet Bros. Mfg. Co., Indianapolis, Ind.

YALE TRANSMISSION BAND OILER

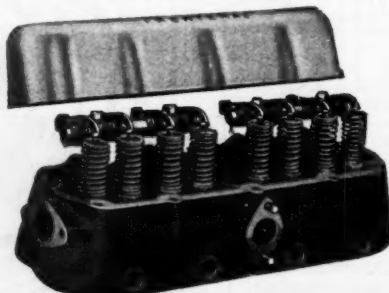
Made for attachment under the Ford transmission cover plate, it is claimed to carry oil to the clutch bands when descending hills. It is a perforated steel plate, catching the oil as it is splashed by the revolving parts in the transmission, and allowing it to drip over the bands and clutch throw-out. Price \$1. Yale Corp., Los Angeles.

GAUNTt SHIFT-O-LITES FOR TURNING HEADLIGHTS

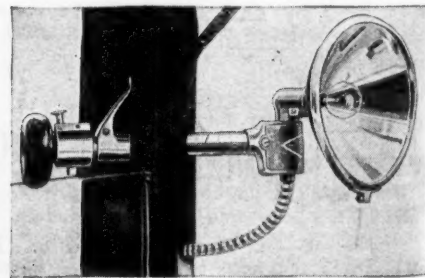
This is an arrangement of controls attached to the headlights to permit tilting up or down, right or left. The control is effected by a lever on the dash operated by the driver. The rays of both lights may be focused on one center, giving an intense light. Gauntt Shift-o-Lights, Fort Wayne, Ind.



New Hartford shock absorber



Frontenac cylinder head for Fords



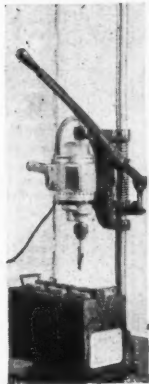
Thomson spotlight and control

Service Equipment

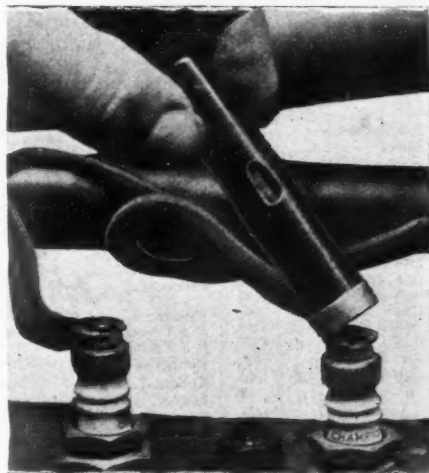
Time Savers for the Shop

RARE GAS USED TO TEST CIRCUITS

A new use for neon, a gas which is found in minute quantities in the atmosphere, has been found in the Airco ignition gage. The passage of an electric current causes the gas, which is enclosed in a glass tube, to glow differently under different conditions. When the gage is applied to a spark plug terminal, the tube glows a medium orange, if conditions are as they should be, while if the electrodes are too close or are fouled with carbon, the glow will be dim. If the electrodes are too far apart, the glow will be brilliant, and in the case of a short circuit there will be no glow at all. The gage will also function as a tester for breaks in insulation, glowing brightest at the point of break. The price of the gage is \$1.—Edward A. Cassidy Co., 280 Madison Ave. New York.



Black & Decker battery drill stand



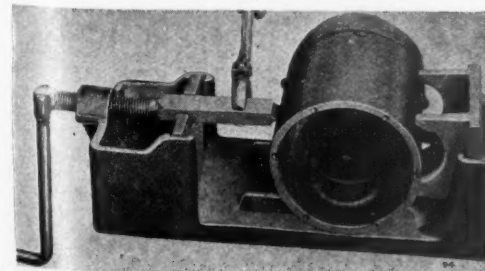
How the Airco gage is used

WHYBROW EXHAUST GAS CONVEYOR

This is a flexible metal hose, asbestos packed, for carrying exhaust gases from the car to a pipe leading to the outside of the service building. The hose is equipped with a handle, lock nuts where it passes through the wall, to permit easy installation, and a self-adjusting mouth to fit the exhaust pipe without leaking. Whybrow Specialty Co., First National Bank Bldg., Whiting, Ind.



Whybrow exhaust gas conveyor



Starting motor assembly and disassembly tool

CINCINNATI PORTABLE DRILL

This is a lightweight portable electric hand drill of 3/16 in. capacity, with pistol grip. It is suitable for drilling in steel, brass, aluminum and sheet metal and for automobile body work, car building and window frames, and it makes a practical tool for wood boring. It is equipped with universal motor, for use on direct and alternating current of the same voltage. The motor housing, end caps and handle are made of aluminum, and the armature and gear studs are mounted on ball bearings. The Cincinnati Electrical Tool Co., Cincinnati.



Esco double face flaring tool

BLACK AND DECKER BATTERY DRILL STAND

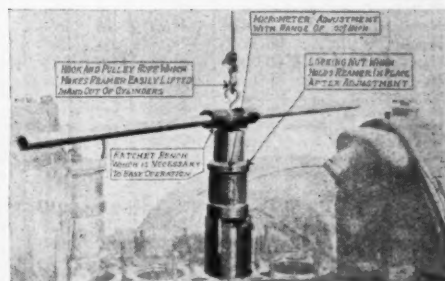
An outfit designed primarily for drilling out terminals in storage batteries is the standard Black & Decker 3/8 in. portable electric drill which can be attached to or detached from the stand in a few minutes. This outfit has a capacity up to 3/4 in. in lead and 3/8 in. in steel. It can also be used for drilling in hardwood up to 9/16 in. The complete equipment consists of the battery drill stand, as illustrated, with one standard B & D 3/8 in. portable electric drill and two special lead boring bits. Price \$135. Black & Decker Mfg. Co., Baltimore.

RANSOME PARALLEL REAMER

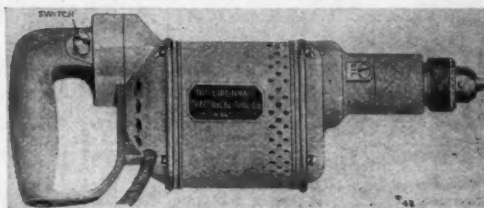
The blades of the Ransome parallel expansion reamer are anchored by means of flanges that run in grooves. The blades are provided with a pilot end which permits them to enter the cylinder a short distance before they start cutting. The reamer is then adjusted to the required size. The actual cutting of the cylinder walls is done by a small corner of the blades. A counter-weighted attachment balances the weight of the reamer and facilitates handling. Prices range from \$59 to \$69. H. A. Hopkins & Co., 247 La Porte ave., South Bend, Ind.

STARTING MOTOR ASSEMBLY AND DISASSEMBLY TOOL

This tool is designed to facilitate the assembly and disassembly of Ford starting motors and generators, including removing and replacing rivets, gears, bearings and screws in the field. With each tool is furnished a jig for holding the armature for repairs, truing and smoothing the commutator, under-cutting mica, etc. Miles Mfg. Co., Newton, Ia.



Ransome parallel expansion reamer



Cincinnati portable drill

Specifications of Current Passenger Car Models

NAME AND MODEL	Engine Make	Cylinders, Bore and Stroke	WB	Tires	2-Pass.	5-Pass.	7-Pass.	Coupe	Sedan	NAME AND MODEL	Engine Make	Cylinders, Bore and Stroke	WB	Tires	2-Pass.	5-Pass.	7-Pass.	Coupe	Sedan
Ambassador.....R	Cont.	6-3 1/2 x 5 1/4	136	33x5	14500	14500	16500	Maxwell.....25	Own.	4-3 1/2 x 4 1/2	109	30x3 1/2	\$ 845	\$ 845	1445	1545
American.....C	H-S.	6-3 1/2 x 5	127	32x4	\$2195	2195	2350	.....	3150	McFarlan.....1921	Own.	6-4 1/2 x 6	140	33x5	6300	6300	7500	7500
Anderson.....Series 40	Cont.	6-3 1/2 x 4 1/2	120	33x4	2195	1650	1795	\$2450	2550	Mercer.....Series 5	Own.	4-3 1/2 x 6 1/2	132	32x4 1/2	3950	3950	4850	5250	
Apperson.....8-21-S	Own.	8-3 1/2 x 5	130	34x4 1/2	.....	3000	3250	4500	4500	Merit.....Cont.	Cont.	6-3 1/2 x 4 1/2	119	32x4	1985	1985	.....	.....
Apperson.....Anniversary	Own.	8-3 1/2 x 5	130	34x4 1/2	.....	3500	3750	.....	.....	Meteor.....R & RR	Dues.	4-4 1/2 x 6	129	32x4	5500	5500	.....	.....
Auburn.....6-51	Cont.	6-3 1/2 x 4 1/2	121	32x4	1670	1695	1760	2475	2495	Metz.....M6	Rut.	6-3 1/2 x 5	120	32x4	1995	1995	2795	2895	
Beggs.....20T	Cont.	6-3 1/2 x 4 1/2	120	33x4	1775	1520	.....	2320	2420	Muchel.....F-40	Own.	6-3 1/2 x 5	120	32x4	.....	1790	.....	.....
Bell.....4-32	H-S.	4-3 1/2 x 5	114	31x4	.....	1495	.....	.....	.....	Mitchell.....F-40	Own.	6-3 1/2 x 5	120	33x4	1490	1490	.....	.....
Bell.....6-50	H-S.	6-3 1/2 x 5	124	32x4	.....	1695	.....	.....	.....	Mitchell.....F-42	Own.	6-3 1/2 x 5	127	33x4	.....	1795	.....	.....
Biddle.....B1 & B5	Buda.	4-3 1/2 x 5 1/2	121	32x4	3475	3475	.....	4750	.....	Mitchell.....F-45	Own.	6-3 1/2 x 5	120	33x4	.....	2290	2440	.....
Birch Super-Four.....	H-S.	4-3 1/2 x 5	117	33x4	1195	1195	1245	.....	1795	Moller.....A	Own.	4-2 1/2 x 4	100	27x3 1/2	2000	.....	.....	.....
Birch Light Four.....	LeL.	4-3 1/2 x 4 1/2	108	30x3 1/2	995	995	.....	.....	.....	Monroe.....S-9 & 10	Own.	4-3 1/2 x 4 1/2	115	32x3 1/2	1285	1295	.....	.....
Birch Light Six.....	H-S.	6-3 1/2 x 5	117	33x4	1395	1395	1445	.....	1995	Monroe.....S-11 & 12	Own.	4-3 1/2 x 4 1/2	115	33x4	.....	2075	2175	.....
Bour-Davis.....21S	Cont.	6-3 1/2 x 5 1/2	126	33x4 1/2	2385	2385	2385	.....	.....	Moore.....6-48	Cont.	6-3 1/2 x 4 1/2	122	32x4	1785	1785	2285	2785
Brewster.....91	Own.	4-4 1/2 x 5 1/2	125	32x4 1/2	7000	7000	.....	.....	10500	Moore.....6-68	Cont.	6-3 1/2 x 4 1/2	125	32x4 1/2	.....	2285	.....	.....
Buick.....1922-31-35-36-37	Own.	4-3 1/2 x 4 1/2	109	31x4	935	975	.....	1475	1650	Murray-Mac Six.....	Own.	6-3 1/2 x 5 1/2	128	34x4 1/2	4250	4250	4250	.....
Buick.....1922-44-5-6-7	Own.	6-3 1/2 x 4 1/2	118	33x4 1/2	1495	1525	.....	2135	2435	Nash.....681-7	Own.	6-3 1/2 x 5	121	33x4	1525	1545	1695	2395
Buick.....1922-48-9-50	Own.	6-3 1/2 x 4 1/2	124	34x4 1/2	.....	.....	1735	2325	2635	Nash.....682	Own.	6-3 1/2 x 5	127	34x4 1/2	.....	1695	.....	.....
Bush.....E.C.4	Lyc.	4-3 1/2 x 5	116	33x4	.....	1195	.....	.....	.....	Nash Four.....41-4	Own.	4-3 1/2 x 5	112	32x3 1/2	1025	1045	1645	1835
Bush.....E.C.6	Rut.	6-3 1/2 x 5	116	33x4	.....	1345	.....	1750	1850	National Sixtet.....BB	Own.	6-3 1/2 x 5 1/2	130	32x4 1/2	2990	2990	4140	4240
Cadillac.....61	Own.	8-3 1/2 x 5 1/2	132	33x5	3790	3790	3940	4690	4950	Noma.....1C	Cont.	6-3 1/2 x 4 1/2	128	32x4 1/2	2600	2600	3200	3700	
Case.....V	Own.	6-3 1/2 x 4 1/2	126	34x4 1/2	.....	2250	2250	2900	3285	Norwalk.....430-KS	Lyc.	4-3 1/2 x 5	116	32x3 1/2	.....	1035	.....	.....
Chalmers.....6-30	Own.	6-3 1/2 x 4 1/2	117	32x4	1495	.....	.....	2295	2445	Oakland.....31-D	Own.	6-2 1/2 x 4 1/2	114	32x4	1095	1145	1625	1725
Chalmers.....6-30	Own.	6-3 1/2 x 4 1/2	122	33x4 1/2	.....	.....	1645	.....	.....	Ogren.....6-T	Own.	6-3 1/2 x 5 1/2	135	33x5	4450	4250	4375	5200
Champion.....Tourist	Lyc.	4-3 1/2 x 5	113	32x3 1/2	1050	995	.....	.....	.....	Oldsmobile.....43-A	Own.	4-3 1/2 x 5 1/2	115	32x4	1145	1145	1645	1845
Champion.....Special	H-S.	4-3 1/2 x 5	118	32x4	1295	1295	.....	.....	.....	Oldsmobile.....37-A	Own.	6-2 1/2 x 4 1/2	112	32x4	1450	1450	2145	2145
Chandler.....Six	Own.	6-3 1/2 x 5	123	33x4	1785	1785	2785	2885	.....	Oldsmobile.....46	Own.	8-2 1/2 x 4 1/2	122	33x4 1/2	1735	1735	2635	2635
Chevrolet.....490	Own.	4-3 1/2 x 4	102	30x3 1/2	525	525	.....	875	875	Oldsmobile.....47	Own.	8-2 1/2 x 4 1/2	115	32x4	1625	1625	2185	2425
Chevrolet.....FB	Own.	4-3 1/2 x 4 1/2	110	32x4	975	975	.....	1575	1575	Overland.....4	Own.	4-3 1/2 x 4	100	30x3 1/2	595	595	850	895
Cleveland.....40	Own.	6-3 1/2 x 4 1/2	112	32x4	1295	1295	.....	2195	2295	Packard.....Single-Six	Own.	6-3 1/2 x 4 1/2	116	33x4 1/2	2075	2075	3750	3975
Climber Four.....	H-S.	4-3 1/2 x 5	115	33x4	1450	1385	.....	.....	.....	Packard.....Twin Six	Own.	12-3 1/2 x 5	136	35x5	4850	4850	6800	6800
Climber Six.....	H-S.	6-3 1/2 x 5	125 1/2	32x4 1/2	2250	2250	.....	.....	.....	Paige.....6-44	Own.	6-3 1/2 x 5	119	32x4	1635	1635	2450	2570
Cole.....870	North.	6-3 1/2 x 5	115	32x4	1195	1195	.....	1995	1995	Paige.....6-46	Cont.	6-3 1/2 x 5	131	33x4 1/2	1395	1395	2875	3535
Columbia Challenger.....	Rut.	6-3 1/2 x 5	115	32x4	1475	1475	1475	2295	2350	Pan American.....6-55	H-S.	6-3 1/2 x 5	121	33x4	2000	2000	2100	.....
Columbia.....D-C&CS	Cont.	6-3 1/2 x 4 1/2	115	32x4	1475	1475	1475	2295	2350	Parenti.....1921	Own.	8-2 1/2 x 4 1/2	125	32x4	2000	2000	3000	3000	
Comet.....C-53	Cont.	6-3 1/2 x 4 1/2	125	33x4 1/2	.....	2350	2450	.....	3650	Paterson.....650	Cont.	6-3 1/2 x 4 1/2	120	33x4	1595	1625	2695	2695
Commonwealth.....44	H-S.	4-3 1/2 x 5	117	32x4	1395	1395	.....	2465	.....	Peerless.....56-S-7	Own.	8-3 1/2 x 5	125	34x4 1/2	2880	2880	3500	3790
Crawford.....21-6-10	Cont.	6-3 1/2 x 4 1/2	122 1/2	32x4	3000	3000	3000	4500	.....	Piedmont.....4-30	Lyc.	4-3 1/2 x 5	116	32x3 1/2	.....	970	.....	.....
Crow-Elkhart.....163-65	Lyc.	4-3 1/2 x 5	117	32x3 1/2	11295	1295	.....	.....	.....	Piedmont.....6-40	Cont.	6-3 1/2 x 4 1/2	122	32x4	1285	1285	.....	.....
Crow-Elkhart.....563-65	H-S.	6-3 1/2 x 5	117	33x4	11545	1545	.....	2395	.....	Pierce-Arrow.....	Own.	6-4 1/2 x 5	138	33x5	7000	6500	8000	8500
Daniels.....D-19	Own.	8-3 1/2 x 5 1/2	132	34x4 1/2	5350	5350	6250	6950	.....	Pilot.....6-45	Teetor	6-3 1/2 x 5	120	32x4	1945	1895	.....	.....
Davis.....61-67	Cont.	6-3 1/2 x 4 1/2	120	32x4	11995	1695	1995	2795	2795	Pilot.....6-50	H-S.	6-3 1/2 x 5	126	32x4 1/2	2285	2285	3350	3400	
Diapatch.....	Wisc.	4-3 1/2 x 5	120	34x4	1250	1350	1525	1575	.....	Porter.....46	Own.	4-4 1/2 x 5 1/2	142	35x5	6750	6750	Price	Price
Dixie Flyer.....H-S-70	H-S.	4-3 1/2 x 5	112	32x4	1345	1345	1845	1995	1995	Premier.....6-D	Own.	6-3 1/2 x 5 1/2	126 1/2	33x5	3790	3690	4690	5190	
Dodge Brothers.....	Own.	4-3 1/2 x 4 1/2	114	32x4	935	985	.....	1585	1785	Premcar.....6-40	Falls.	6-3 1/2 x 4 1/2	117	32x4	1295	1295	1945	1995
Dorris.....6-80	Own.	6-4 1/2 x 5	132	33x5	14785	4785	5800	6690	.....	Raleigh.....A-6-60	H-S.	6-3 1/2 x 5	122	32x4 1/2	2250	2250	3100	3200
Dort.....17-12	D-Ly.	4-3 1/2 x 5	108	31x4	985	985	.....	1535	1685	R & V Knight.....R	Own.	4-3 1/2 x 5	116	32x4	1500	1500	2650	2750
Driggs.....	Own.	4-2 1/2 x 4 1/2	104	30x3 1/2	1275	1275	.....	1975	.....	R & V Knight.....J	Own.	6-3 1/2 x 5 1/2	127	32x4 1/2	3350	3350	4000	4200
Du Pont.....A	Own.	4-3 1/2 x 5 1/2	124	32x4 1/2	3400	3400	.....	4900	.....	Reo Series A & B.....T-6	Own.	6-3 1/2 x 5	120	33x4	1650	1650	2300	2750
Durant.....A-22	Cont.	4-3 1/2 x 4 1/2	109	31x4	.....	890	.....	1365	1365	Revere.....C	Dues.	4-4 1/2 x 6	131	32x4 1/2	4850	4050	4650	.....
Earl.....	Own.	4-3 1/2 x 5 1/2	112	32x4	1375	1285	.....	1995	.....	Roamer.....6-54-E	Cont.	6-3 1/2 x 5 1/2	128	32x4 1/2	2750	2750	3850	3950
Elcar.....K-4	Lyc.	6-3 1/2 x 4 1/2	117	33x4	1145	1145	1195	1545	1615	Roamer.....4-75-E	Dues.	4-4 1/2 x 6	132	32x4 1/2	3850	3650	.....	.....
Elcar.....7-R	Cont.	6-3 1/2 x 4 1/2	117	33x4	1595	1595	1595	2395	2495	Rolls-Royce.....	Own.	4-4 1/2 x 6	143 1/2	33x5	U. S. Chassis Price	11750	.....	.....
Elgin.....K-1	Falls.	6-3 1/2 x 4 1/2	118	33x4	1595	1495	1595	2395	2495	Romer.....	Cont.	6-3 1/2 x 4 1/2	120	33x4	2000	2000	2100	2450	
Essex.....	Own.	4-3 1/2 x 5	108 1/2	32x4	1375	1375	.....	1880	2230	Saxon.....125	Own.	4-3 1/2 x 5	112	32x4	1345	1295	1995	1695
Fergus.....S-5-21	Own.	6-3 1/2 x 5	126	33x4 1/2	.....	Chassis Price	8500	.....	.....	Sayers Six.....DP	Cont.	6-3 1/2 x 4 1/2	118	33x4	1795	1795	2565	.....
Ferris.....C-20	Cont.	6-3 1/2 x 5 1/2	130	32x4 1/2	2695	2595	.....	3695	.....	Scripps-Booth.....B-39-42	North.	6-2 1/2 x 4 1/2	115	32x4	1275	1295	1950	2100
Ford.....T	Own.	4-3 1/2 x 4	109	30x3 1/2	325	1355	.....	595	660	Scripps-Booth.....F-43-46	Cont.	6-3 1/2 x 4 1/2	115	32x4	1470	1490	2350	2375
Franklin.....9-B	Own.	6-3 1/2 x 4	115	32x4	2300	2350	.....	2650	3350	Seneca.....L & O	LeL.	4-3 1/2 x 4 1/2	108	30x3 1/2	1045	1015	.....	.....
Gardner.....G	Lyc.	4-3 1/2 x 5	112	32x3 1/2	1995	995	.....	1795	.....	Severin.....Six	Cont.	6-3 1/2 x 5 1/2	122 1/2	33x4 1/2	1485	1485	2100	2250
Grant.....S	Own.	6-3 1/2 x 4 1/2	116	32x4	1550	1550	.....	2450	2450	Severin.....Six	Cont.	6-3 1/2 x 5 1/2	122 1/2	33x5	2550	2550	3250	3350
H.C.S.....	Weid.	4-3 1/2 x 5 1/2	120	32x4 1/2	2725	12775	.....	3450	3650	Skelton.....35	Lyc.	4-3 1/2 x 5	112	32x3 1/2	995	995	.....	.....
Halladay, Manh. Special.....	Rut.	6-3 1/2 x 5	118	33x4	.....	1595	.....	.....	.....	Southern Six.....660-2	H-S.	6-3 1/2 x 5	127	32x4 1/2	2375	2375	2395	.....
Halladay, Craft Special.....	Rut.	6-3 1/2 x 5	123	33x4	.....	2195	.....	.....	.....	Standard.....	Own.	8-3 1/2 x 5	127	34x4 1/2	3400	3100	4400	4800
Handley-Knight.....	Kn ht.	4-4 1/2 x 4 1/2	125	32x4 1/2	.....	2850	.....	4185	.....	Stanley Steamer.....	Own.	2-4 1/2 x 5	130	34x4 1/2				

Specifications of Current Motor Truck Models

NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES		Final Drive	NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES		Final Drive	NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES		Final Drive
				Front	Rear						Front	Rear						Front	Rear	
Acason	3/4	\$1650	3 1/2 x 5	34x5 1/2	34x5 1/2	W	Corbitt, B	2 1/2	\$3300	4 1/2 x 5 1/2	36x4	36x7	W	Gary, I	1 1/2	\$2550	4 x 5 1/2	36x3 1/2	36x5	W
Acason, R	1	2260	3 1/2 x 5 1/2	36x3 1/2	36x5	W	Corbitt, A	3 1/2	4100	4 1/2 x 5 1/2	36x5	36x10	W	Gary, J	2 1/2	3150	4 1/2 x 5 1/2	36x4	36x7	W
Acason, RB	1 1/2	2185	3 1/2 x 5 1/2	36x3 1/2	36x5	W	Corbitt, AA	5	5000	4 1/2 x 6	36x6	40x6d	W	Gary, K	3 1/2	4050	4 1/2 x 6	36x5	40x5d	W
Acason, H	2 1/2	3295	4 1/2 x 5 1/2	36x4	36x8	W								Gary, M	5	5150	5 x 6 1/2	36x6	40x6d	W
Acason, L	3 1/2	4295	4 1/2 x 5 1/2	36x5	36x10	W	Day-Elder, A	1	2100	3 1/2 x 5	34x3 1/2	34x4	W	Gersix, M	1 1/2	3100	4 x 5 1/2	36x3 1/2	36x7	W
Acason, M	5	5250	5 x 6 1/2	36x6	40x12	W	Day-Elder, B	1 1/2	2300	3 1/2 x 5	34x3 1/2	34x5	W	Gersix, K	2 1/2	3500	4 1/2 x 5 1/2	36x4	36x8	W
Ace, C	1 1/2	2205	3 1/2 x 5 1/2	34x3 1/2	34x5	W	Day-Elder, D	2	2750	4 1/2 x 5 1/2	36x4	36x7	W	Gersix	3 1/2	4500	4 1/2 x 6	36x5	40x12	W
Ace, A	2 1/2	2795	4 1/2 x 5 1/2	36x4	36x7	W	Day-Elder, C	2 1/2	3025	4 1/2 x 5 1/2	36x4	36x7	W	Golden West, GH	3	5000	4 1/2 x 6	36x7	36x7	W
Acme, G	1 1/2	.....	3 1/2 x 5	35x5 1/2	35x5 1/2	W	Day-Elder, F	3 1/2	3750	4 1/2 x 5 1/2	36x5	36x5d	W	Golden West, G	3 1/2	4500	4 1/2 x 6	36x6	36x6	W
Acme, B	2 1/2	.....	3 1/2 x 5	34x3 1/2	34x5	W	Day-Elder, E	5	4250	4 1/2 x 6	36x5	40x6d	W	Golden West, H	3 1/2	5000	4 1/2 x 6	36x6	36x6	W
Acme, F	1 1/2	.....	3 1/2 x 5	36x4	36x7	W	Dearborn, E	1	1700	3 1/2 x 5 1/2	35x5 1/2	35x5 1/2	W	Golden West, I	4	5500	4 1/2 x 6	36x6	36x6	W
Acme, AC	2 1/2	.....	4 1/2 x 5 1/2	36x4	36x7	W	Dearborn, FX	1 1/2	2300	3 1/2 x 5 1/2	34x4	34x5	W	Golden West, K	7	6000	5 1/2 x 6	36x6	36x6	W
Acme, C	3 1/2	.....	4 1/2 x 5 1/2	36x5	40x10	W	Dearborn, F	1 1/2	2180	3 1/2 x 5 1/2	34x4	34x5	W	Golden West, HA	7	6000	4 1/2 x 6	36x6	36x10	W
Acme, E	5	.....	4 1/2 x 6	36x6	40x12	W	Dearborn, 48	2	2590	3 1/2 x 5 1/2	35x5 1/2	34x7	W	Graham Bros. A	1 1/2	1495	3 1/2 x 5	33x5 1/2	33x5 1/2	B
Akr' Multi-Trk20	1	1995	4 x 5	34x5	34x5	B	Defiance, G	1	1695	3 1/2 x 5	35x5 1/2	35x5 1/2	I	Gramm-Bern, 10	1	2050	3 1/2 x 5	36x3 1/2	36x5	I
American, 25	2 1/2	3350	4 x 5	36x4	36x4d	W	Defiance, D	1 1/2	2095	3 1/2 x 5	35x5 1/2	36x6	I	Gramm-Bern, 15	1 1/2	2725	3 1/2 x 5	36x4	36x5	I
American, 40	4	4275	4 1/2 x 6	36x5	36x5d	W	Defiance, E	2	2275	3 1/2 x 5	35x5 1/2	38x7	I	Gramm-Bern, 20	2	3175	4 1/2 x 5 1/2	36x4	36x7	W
Apex, G	1	1450	3 1/2 x 5	33x5 1/2	33x5 1/2	I	DeKalb, E2 1/2	2 1/2	2600	4 1/2 x 5 1/2	36x4	36x6	W	Gramm-Bern, 25	2 1/2	3575	4 1/2 x 5 1/2	36x5	40x5d	W
Apex, B	1 1/2	1915	3 1/2 x 5 1/2	34x3 1/2	34x4	I	DeKalb, E2	2 1/2	2600	4 1/2 x 5 1/2	34x3 1/2	34x5	W	Gramm-Bern, 35	3 1/2	4375	4 1/2 x 5 1/2	36x5	40x5d	W
Apex, E	2 1/2	2695	4 1/2 x 5 1/2	36x4	36x7	I	DeMartini, 1 1/2	1 1/2	3300	4 x 5 1/2	36x3 1/2	36x7	W	Gramm-Bern, 50	5	5275	4 1/2 x 6	36x6	40x6d	W
Apex, F	3 1/2	3975	4 1/2 x 6	36x5	36x10	I	DeMartini, 3	3	4250	4 1/2 x 5 1/2	36x4	36x10	W							
Armleder, 20	1	.....	3 1/2 x 5 1/2	34x3 1/2	34x5	W	DeMartini, 4	4	4800	4 1/2 x 6	36x5	36x12	W	Hahn, J	1	.....	3 1/2 x 5	34x5	34x5	W
Armleder, HW	2 1/2	.....	4 1/2 x 5 1/2	36x4	36x7	W	Denby, 31	1 1/2	1625	3 1/2 x 5	35x5	35x5	B	Hahn, CD	1 1/2	.....	4 1/2 x 5 1/2	36x3 1/2	36x5	W
Armleder, KW	3 1/2	.....	4 1/2 x 5 1/2	36x5	36x5d	W	Denby, 33	1 1/2	2300	3 1/2 x 5	35x5 1/2	38x7	I	Hahn, EE	2 1/2	.....	4 1/2 x 5 1/2	36x4	36x5	W
Atco, B	1 1/2	.....	3 1/2 x 5 1/2	34x5	36x6	W	Denby, 34	2	2600	3 1/2 x 5	36x3 1/2	36x6	I	Hahn, F	3 1/2	.....	4 1/2 x 5 1/2	36x5	36x10	W
Atco, BI	1 1/2	.....	3 1/2 x 5 1/2	34x5	36x6	W	Denby, 25	3	3300	4 1/2 x 5 1/2	36x4	36x7	I	Hahn, EF	5	.....	4 1/2 x 6	36x6	40x12	W
Atco, A	2 1/2	.....	4 1/2 x 5 1/2	36x4	36x8	W	Denby, 27	4	4200	4 1/2 x 5 1/2	36x5	36x5d	I	Hal. Fur, E	1	2350	4 x 5	35x5 1/2	35x5 1/2	W
Atlas, M.D.	1	1550	3 1/2 x 5	32x4 1/2	32x4 1/2	W	Denby, 210	5	4850	4 1/2 x 5 1/2	36x6	40x6d	I	Hal. Fur, B	2 1/2	3250	4 1/2 x 5 1/2	35x5	38x7	W
Atterbury, 20R	1 1/2	2475	3 1/2 x 5	34x3 1/2	34x5	W	Dependable, A	3 1/2	1650	4 1/2 x 5 1/2	34x5	36x6	W	Hal. Fur, F	2 1/2	4250	4 1/2 x 5 1/2	36x6	40x10	W
Atterbury, 7CX	2 1/2	3175	4 1/2 x 5 1/2	36x4	36x4d	W	Dependable, C	1 1/2	2350	4 1/2 x 5 1/2	34x3 1/2	34x5	W	Hall	1 1/2	3100	3 1/2 x 5	34x5	38x7	W
Atterbury, 7D	3 1/2	3975	4 1/2 x 5 1/2	36x5	40x5d	W	Dependable, D	2	2650	4 x 5 1/2	34x5	36x6	W	Hall	2 1/2	3275	4 1/2 x 5 1/2	36x4	36x6	W
Atterbury, 8E	5	5125	4 1/2 x 6	36x5	40x6d	W	Dependable, E	2	2950	4 1/2 x 5 1/2	36x4	36x7	W	Hall	3 1/2	4100	4 1/2 x 5 1/2	36x5	36x5d	W
Autocar, 21UF	1 1/2	2300	4 1/2 x 5 1/2	34x4	34x5	D	Dependable, G	3 1/2	3550	4 1/2 x 5 1/2	36x6	38x7	W	Hall	5	5100	4 1/2 x 5 1/2	36x5	40x6d	W
Autocar, 21UG	1 1/2	2400	4 1/2 x 5 1/2	34x4	34x5	D	Diamond, T, O	1	2500	3 1/2 x 5 1/2	34x5	36x6	W	Hall	7	5100	4 1/2 x 5 1/2	36x5	40x6d	C
Autocar, 26Y	.....	4350	4 1/2 x 5 1/2	34x6	36x12	D	Diamond, T, FS	1 1/2	2980	3 1/2 x 5 1/2	36x3 1/2	36x5	W	Harvey, WEA	1 1/2	2550	4 1/2 x 5 1/2	34x3 1/2	34x5	W
Autocar, 26-B	.....	4500	4 1/2 x 5 1/2	34x6	36x12	D	Diamond, T, U	1 1/2	2650	3 1/2 x 5 1/2	36x3 1/2	36x5	W	Harvey, WFA	2	2950	4 1/2 x 5 1/2	34x4	34x7	W
Available, H1 1/2	1 1/2	2175	4 x 5 1/2	36x3 1/2	36x5	W	Diamond, T, K	2	3285	4 x 5 1/2	36x4	36x7	W	Harvey, WHA	3 1/2	3950	4 1/2 x 6	36x5	36x5d	W
Available, H2 1/2	2 1/2	2775	4 x 5 1/2	36x3 1/2	36x6	W	Diamond, T, U	3 1/2	4675	4 1/2 x 5 1/2	36x5	36x5d	W	Harvey, WKA	5	4500	4 1/2 x 6	36x6	40x6d	W
Available, H3 1/2	3 1/2	3475	4 x 5 1/2	36x4	36x8	W	Diamond, T, EL	5	5100	4 1/2 x 5 1/2	36x6	40x6d	W	Hawkeye, K	1 1/2	1850	3 1/2 x 5 1/2	34x3 1/2	34x5	I
Available, H5	5	5375	4 1/2 x 6	36x6	40x12	W	Diamond, T, S	5	5650	4 1/2 x 6	36x6	40x6d	W	Hawkeye, M	2	2650	4 1/2 x 5 1/2	36x4	36x6	I
Available, H7	7	6000	5 x 6	36x6	40x14	B	Diehl, B	1	.....	3 1/2 x 5	36x4	36x6	I	Hawkeye, N	3 1/2	3700	4 1/2 x 6	36x5	36x10	I
Avery	1	.....	3 x 4	34x5 1/2	34x5 1/2	I	Diehl, F	1 1/2	1350	3 1/2 x 5	34x4 1/2	34x4 1/2	I	Hendrickson, N	3 1/2	3150	4 1/2 x 5 1/2	36x4	36x7	W
							Doane	1 1/2	4100	4 1/2 x 5 1/2	36x5	38x7	C	Hendrickson, M	3 1/2	3975	4 1/2 x 5 1/2	36x5	36x5d	W
Beck, A Jr.	1	1950	3 1/2 x 5	34x3 1/2	34x4	I	Doane	2 1/2	5100	4 1/2 x 5 1/2	36x5	36x5d	C	Huffman, B	1 1/2	1905	3 1/2 x 5	34x3 1/2	34x6	I
Beck, C	2	2550	4 1/2 x 5 1/2	36x4	36x6	I	Dodge Brothers	6	6000	5 x 6 1/2	36x6	40x6d	C	Huffman, C	1 1/2	1705	3 1/2 x 5	34x3 1/2	34x6	I
Bell, M	1	1495	3 1/2 x 5 1/2	35x5	35x5 1/2	W	Dorris, K-4	2-2 1/2	885	3 1/2 x 5 1/2	33x4 1/2	33x4 1/2	W	Hurlburt	1 1/2	.....	4 x 5 1/2	34x4	34x6	W
Bell, E	1 1/2	2100	3 1/2 x 5 1/2	34x3 1/2	34x5	W	Dorris, K-7	3 1/2	4400	4 1/2 x 5 1/2	36x4	36x7	W	Hurlburt	2 1/2	.....	4 1/2 x 5 1/2	36x4	36x4d	W
Bell, O	2 1/2	2550	4 1/2 x 5 1/2	36x4	36x6	W	Double Drive B	3	4000	4 1/2 x 5 1/2	36x5	36x10	W	Hurlburt	3 1/2	.....	4 1/2 x 6	36x5	36x5d	W
Belmont, D	2	2675	3 1/2 x 5	34x3 1/2	34x6	D	Douglas G	1 1/2	2050	3 1/2 x 5 1/2	36x5	37x8	W	Hurlburt	5	.....	4 1/2 x 6	36x5	40x6d	W
Belmont, F	3 1/2	3525	4 x 6	36x5	36x5d	D	Douglas I	3	3250	4 1/2 x 5 1/2	36x6	37x8	W							
Bessemer, G	1	1395	3 1/2 x 5	35x5 1/2	35x5 1/2	I	Duplex, A	1 1/2	2775	4 x 5 1/2	35x5 1/2	38x7	W	Indep'd't (Iowa), B	1	1665	3 1/2 x 5	34x3 1/2	34x4	W
Bessemer, H-2	1 1/2	1995	3 1/2 x 5	36x3 1/2	36x5	I	Duplex, E	3 1/2	4250	4 1/2 x 5 1/2	36x6	38x8	I	Indep'd't (Iowa), C	1 1/2	2040	3 1/2 x 5 1/2	34x3 1/2	34x5	I
Bessemer, J-2	2 1/2	2595	4 1/2 x 5 1/2	36x4	36x4d	I	Duty, 21	2	1490	3 1/2 x 5	34x3 1/2	34x5	I	Indep'd't (Ia.), H	2 1/2	2585	4 1/2 x 5 1/2	36x4	36x5	W
Bessemer, K-2	4	3495	4 1/2 x 5 1/2	36x5	36x10	I	Eagle, 100-2	2	2275	3 1/2 x 5 1/2	34x4	34x7	I	Indep'd't (Ohio), F	2 1/2	2985	4 1/2 x 5 1/2	36x4	36x4d	W
Brinton, F	2 1/2	3400	4 1/2 x 5 1/2	36x4	36x7	W	Erie, E	1 1/2	.....	3 1/2 x 5 1/2	36x4	36x6	W	Indep'd't (Ohio), K	1 1/2	3985	4 1/2 x 5 1/2	36x5	36x5d	W
Brockway, E	3 1/2	1675	3 1/2 x 5	35x5 1/2	35x5 1/2	W	Erie, A	2 1/2	.....	4 1/2 x 5 1/2	36x4	36x4d	W	Indiana, 12	1 1/2	2290	3 1/2 x 5 1/2	34x3 1/2	34x5	W
Brockway, S-4	1 1/2	2250	3 1/2 x 5	36x3 1/2	36x5	W	F.W.D., B	3	4200	4 1/2 x 5 1/2	36x6	36x6	B	Indiana, 20	2	2950	4 1/2 x 5 1/2	36x4	36x7	W

Specifications of Current Motor Truck Models—Continued

NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES	Final Drive	NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES	Final Drive	NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES	Final Drive
				Front Rear						Front Rear						Front Rear	
Kelly-S., K-45	4	\$4550	4 1/2 x 5 1/2	36x5 36x5	C	O. K., K1	1 1/2	\$2675	4 x 5 1/2	36x3 1/2 36x5	W	Southern, 15	1 1/2	\$2590	3 1/2 x 5 1/2	36x5 34x4	W
Kelly-S., K-50	5	4900	4 1/2 x 5 1/2	36x5 36x5	C	O. K., L1	2 1/2	3150	4 1/2 x 5 1/2	36x4 36x5	W	Southern, 20	2	2900	4 1/2 x 5 1/2	36x5 40x3	W
Kelly-S., K-60	6	5100	4 1/2 x 5 1/2	36x5 36x5	C	O. K., M1	3 1/2	4250	4 1/2 x 5 1/2	36x5 36x5d	W	Standard, 1-K	1-1 1/2	1800	3 1/2 x 5 1/2	34x3 1/2 34x5	W
Keystone, 40	2	2150	3 1/2 x 5 1/2	34x5 38x7	I	Ogden, A1	1 1/2	2550	3 1/2 x 5 1/2	36x3 1/2 36x5	W	Standard, 76	2 1/2-3	2300	4 1/2 x 5 1/2	36x4 36x7	W
Kimball, AB	2	3675	4 x 6	36x4 36x7	W	Ogden, E	2 1/2	3250	4 1/2 x 5 1/2	36x4 36x7	W	Standard, 66	3 1/2-4	3300	4 1/2 x 5 1/2	36x5 36x10	W
Kimball, AC	2 1/2	3975	4 1/2 x 6	36x4 36x8	W	Old Hickory, W	1	2175	3 1/2 x 5 1/2	36x3 1/2 36x4	W	Standard, 5-K	5-7	4400	4 1/2 x 6	36x6 40x12	W
Kimball, AK	3	4500	4 1/2 x 6	36x4 36x10	W	Old Reliable, A	1 1/2	2350	4 x 5	34x4 36x6	W	Sterling, 1 1/2	1 1/2	3200	4 x 5 1/2	36x3 1/2 36x5	W
Kimball, AE	4	5000	4 1/2 x 6	36x5 40x12	W	Old Reliable, B	2 1/2	3500	4 1/2 x 6	34x4 36x4d	W	Sterling, 2	2	3500	4 x 5 1/2	36x4 36x6	W
Kimball, AF	5	5975	5 x 6	36x6 40x7d	W	Old Reliable, C	3 1/2	4250	4 1/2 x 6	36x5 36x5d	W	Sterling, 2 1/2	2 1/2	3500	4 1/2 x 5 1/2	36x4 36x6	W
Kissel, Express	1	1955†	3 1/2 x 5 1/2	34x5 34x5†	W	Old Reliable, D	6	5250	4 1/2 x 6	36x6 40x6d	W	Sterling, 3 1/2	3 1/2	4650	4 1/2 x 6 1/2	36x5 40x5d	W
Kissel, Utility	1 1/2	1975	3 1/2 x 5 1/2	36x3 1/2 36x5	W	Old Reliable, KLM	7	6000	4 1/2 x 6	36x6 40x7d	C	Sterling, 3-W	5	5500	5 x 6 1/2	36x6 40x6d	W
Kissel, Freighter	2 1/2	2575	4 1/2 x 5 1/2	36x4 36x7	W	Oldsmobile Econ.	1	1095	3 1/2 x 5 1/2	35x5† 35x5†	I	Sterling, 5-C	5	6000	5 x 6 1/2	36x6 40x6d	C
Kissel, H. D.	4	3675	4 1/2 x 5 1/2	36x5 36x5d	W	Olympic, A	2 1/2	3500	4 1/2 x 5 1/2	36x4 36x7	W	Sterling, 7 1/2	7 1/2	6500	5 x 6 1/2	36x6 40x7d	C
Kleiber, AA	1	2600	4 1/2 x 5 1/2	34x3 1/2 34x5	W	Oshkosh, A	2	3750	3 1/2 x 5	36x5† 36x5†	4	Stewart, 14	3 1/2	1395	3 1/2 x 5 1/2	32x4 1/2 32x4 1/2	I
Kleiber, AB	1 1/2	3100	4 1/2 x 5 1/2	36x3 1/2 36x6	W	Oshkosh, AA	2	3850	3 1/2 x 5	36x5† 36x5†	4	Stewart, 15	1	1575	3 1/2 x 5	35x5† 35x5†	I
Kleiber, BB	2	3600	4 1/2 x 5 1/2	36x4 36x7	W	Oshkosh, B	2 1/2	4150	4 x 5 1/2	38x7 38x7	4	Stewart, 9	1 1/2	2200	3 1/2 x 5	34x3 1/2 34x5	I
Kleiber, B	2 1/2	3950	4 1/2 x 5 1/2	36x5 36x8	W	Oshkosh, BB	2 1/2	4300	4 x 5 1/2	38x7 38x7	4	Stewart, 7	2	2800	4 1/2 x 5 1/2	34x4 34x7	I
Kleiber, C	3	4600	4 1/2 x 5 1/2	36x5 36x5d	W	Packard, EC	...	3500	4 1/2 x 5 1/2	36x4 36x7	W	Stewart, 7-X	2 1/2	2950	4 1/2 x 5 1/2	34x4 34x7	I
Kleiber, D	5	5300	5 x 6 1/2	36x6 40x12	W	Packard, ED	...	4100	4 1/2 x 5 1/2	36x5 36x5d	W	Stewart, 10-X	3 1/2	3850	4 1/2 x 6	36x5 36x5d	I
Koehler, M	1 1/2	1885	3 1/2 x 5	34x3 1/2 34x5	W	Packard, EF	...	4500	5 x 5 1/2	36x6† 40x6†	W	Stoughton, A	1	1995	3 1/2 x 5 1/2	34x4 1/2 35x5†	W
Koehler, MCS	2 1/2	2875	4 x 5 1/2	36x4 36x7	W	Packard, EX	...	4000	4 1/2 x 5 1/2	36x6† 40x6†	W	Stoughton, B	1 1/2	2350	3 1/2 x 5 1/2	36x3 1/2 36x5	W
Koehler, F	3 1/2	3935	4 1/2 x 5 1/2	36x5 36x10	W	Paige, 52-19	1 1/2	2880	4 x 5 1/2	34x3 1/2 34x5	W	Stoughton, C	2 1/2	1240	3 1/2 x 5	34x4 1/2 34x4 1/2	W
Koehler, MT, Trac	5	2975	4 x 5 1/2	36x4 36x7	W	Paige, 54-20	2 1/2	3100	4 1/2 x 5 1/2	34x4 34x8	W	Stoughton, D	3	3600	4 1/2 x 5 1/2	36x5d 36x5d	W
						Paige, 51-18	3 1/2	4285	4 1/2 x 5 1/2	36x5 36x5d	W	Sullivan, E	2	3350	4 1/2 x 5 1/2	36x4 36x7	W
Lange, B	2 1/2	3350	4 1/2 x 5 1/2	36x4 36x6	C	Parker, F20	2	3500	4 x 6	34x4 36x4d	W	Sullivan, H	3 1/2	4650	4 1/2 x 6	36x5 36x5d	W
Larabee, KZ	3 1/2-1	1925	3 1/2 x 4 1/2	34x5† 34x5†	B	Parker, J20	3 1/2	4100	4 1/2 x 6	36x5 40x5d	W	Superior, D	1	1650	3 1/2 x 5	34x4 1/2 34x4	I
Larabee, U	1 1/2	2100	3 1/2 x 5	34x3 1/2 34x5	W	Parker, M20	5	5500	4 1/2 x 6	36x6 40x6d	W	Superior, E	2	2600	4 1/2 x 5 1/2	34x4 36x6	I
Larabee, SK	2 1/2	3200	4 1/2 x 5 1/2	36x4 36x7	W	Patriot, Wash'n	2 1/2	3450	4 1/2 x 5 1/2	36x4 36x7	W	Super Truck, 50	2 1/2	3300	4 x 6	36x4 36x8	W
Larabee, FL	3 1/2	4000	4 1/2 x 5 1/2	36x5 36x5d	W	Piedmont, 4-30	1 1/2	1685	3 1/2 x 5	34x4† 34x4†	W	Super Truck, 70	3 1/2	4300	4 1/2 x 6	36x5 40x5d	W
Larabee, FW	5	4800	4 1/2 x 6	36x6 40x6d	W	Pierce-Arrow	2	3200	4 x 5 1/2	36x4 36x4d	W	Super Truck, 100	5	5300	4 1/2 x 6	36x5 40x12	W
Lueninghaus, C	1	2100	3 1/2 x 5	35x5† 35x5†	W	Pierce-Arrow	3 1/2	4350	4 1/2 x 6 1/2	36x5 36x5d	W	Super Truck, 150	7 1/2	6300	5 x 6	36x6 40x7d	W
Lueninghaus, W	1 1/2	2700	4 1/2 x 5 1/2	34x3 1/2 34x5	W	Pioneer, 59	5	4850	4 1/2 x 6 1/2	36x5 40x6d	W						
Lueninghaus	2-2 1/2	3150	4 1/2 x 5 1/2	36x4 36x7	W	Pittsburgh, C-21	2 1/2-3	3500	4 1/2 x 5 1/2	36x5 36x7	W	Texas, A38	3 1/2	1095	3 1/2 x 5	33x4 33x4	I
						Pittsburgh, C-21	2 1/2-3	3500	4 1/2 x 5 1/2	36x5 36x7	W	Texas, TK39	1 1/2	1550	3 1/2 x 5	36x6 38x7	W
Maccar, L	1 1/2	2925	4 1/2 x 5 1/2	36x4 36x6	W	Power, F	1 1/2	...	4 1/2 x 5 1/2	36x6 36x6	W	Tiffin, GW	1 1/2	2400	4 1/2 x 5 1/2	36x3 1/2 36x5	W
Maccar, H-2	2 1/2	3050	4 1/2 x 5 1/2	36x4 36x4d	W	Power, C	1 1/2	...	4 1/2 x 5 1/2	36x5 40x10	W	Tiffin, MW	2 1/2	3100	4 1/2 x 5 1/2	36x4 36x3 1/2d	W
Maccar, M-2	3 1/2	4500	4 1/2 x 6	36x5 36x5d	W	Premcar, B-143	3 1/2	2475	3 1/2 x 5	36x6† 36x6†	W	Tiffin, PW	3 1/2	4100	4 1/2 x 5 1/2	36x5 40x5d	W
Maccar, G	5	5500	4 1/2 x 6	36x5 40x6d	W							Tiffin, F50	5	4800	4 1/2 x 6	36x6 40x6d	W
MacDonald, A	7 1/2	5750	4 1/2 x 6	40x7 40x14	I	Rainier, R-11	3 1/2	2150	3 1/2 x 5	35x5† 35x5†	W	Tiffin, F60	6	5000	4 1/2 x 6	36x6 40x12	W
Mack, AB D.R.	1 1/2	3150	4 x 5	36x4 36x3 1/2d	D	Rainier, R-19	1	2350	3 1/2 x 5	34x3 1/2 34x4	W	Titan, HT	3 1/2	4550	4 1/2 x 6	34x4 40x5d	I
Mack, AB	2 1/2	3400	4 x 5	36x4 36x4d	C	Rainier, R-16	1 1/2	2600	3 1/2 x 5	34x3 1/2 34x5	W	Titan, HD	5	5400	4 1/2 x 6	36x5 40x6d	I
Mack, AB Chain	1 1/2	3000	4 x 5	36x4 36x3 1/2d	C	Rainier, R-18	2	2950	4 1/2 x 5 1/2	34x4 34x6	W	Titan, TS	2 1/2	3400	4 1/2 x 5 1/2	34x4 36x4d	I
Mack, AB Chain	2	3300	4 x 5	36x4 36x4d	C	Rainier, R-20	2 1/2	3500	4 1/2 x 5 1/2	34x4 34x7	W	Tower, J	1 1/2	3000	4 1/2 x 5 1/2	35x5 38x7	W
Mack, AB D.R.	2	3750	4 x 5	36x4 36x4d	C	Rainier, R-25	3 1/2	4500	4 1/2 x 6	36x5 36x5d	W	Tower, H	2 1/2	3475	4 1/2 x 5 1/2	36x4 36x7	W
Mack, AC Chain	3 1/2	4950	5 x 6	36x5 40x5d	D	Rainier, R-17	5	5250	4 1/2 x 6	36x6 36x6d	W	Tower, G	3 1/2	4100	4 1/2 x 5 1/2	36x5 36x5d	W
Mack, AC Chain	5	5500	5 x 6	36x6 40x6d	C	Ranger, TK-20-2	2	...	3 1/2 x 5	36x6† 36x6†	B	Traffic, C	...	1595	3 1/2 x 5	34x3 1/2 34x5	W
Mack, AC Chain	6 1/2	5750	5 x 6	36x6 40x12	C	Reo, F	3 1/2-11	1245	4 1/2 x 1 1/2	34x4 1/2 34x4 1/2	B	Traffic	3	1895	3 1/2 x 5	34x3 1/2 34x7	W
Mack, AC Chain	7 1/2	6000	5 x 6	36x7 40x7d	C	Reliance, 10A	1 1/2	2100	4 x 5 1/2	36x3 1/2 36x5	I	Transport, 20	1	1395	3 1/2 x 5 1/2	34x3 1/2 34x4	I
Mack Trac, AB	5	3400	1 x 5	36x1 33x4d	C	Reliance, 20B	2 1/2	3100	4 1/2 x 5 1/2	36x4 36x4d	I	Transport, 30	1 1/2	1995	3 1/2 x 5 1/2	36x3 1/2 36x5	I
Mack Trac, AC	7	4950	5 x 6	36x5 40x5d	C	Republic, 75	3 1/2	1395†	3 1/2 x 5	32x4 1/2 32x4 1/2	I	Transport, 50	2 1/2	2785	4 1/2 x 5 1/2	36x4 36x7	I
Mack Trac, AC	10	5500	5 x 6	36x6 40x6d	C	Republic, 10	1	1695	3 1/2 x 5	35x5† 35x5†	I	Transport, 70	3 1/2	3850	4 1/2 x 6	36x5 36x10	I
Mack Trac, AC	13	5750	5 x 6	36x6 40x12	C	Republic, 10Exp.	1	2095	3 1/2 x 5	35x5† 35x5†	I	Traylor, B	1 1/2	2390	3 1/2 x 5 1/2	34x3 1/2 34x5	W
Mack Trac, AC	15	6000	5 x 6	36x7 40x7d	C	Republic, 11X	1 1/2	2295	3 1/2 x 5	34x3 1/2 34x5	I	Traylor, C	2	2850	4 x 5 1/2	36x4 36x7	W
Mapleleaf, AA**	2	4150	4 x 5 1/2	36x4 36x7	W	Republic, 19	2 1/2	2795	4 1/2 x 5 1/2	36x4 36x7	I	Traylor, D	3	3300	4 1/2 x 5 1/2	36x4 36x8	W
Mapleleaf, BB**	3	4775	4 1/2 x 5 1/2	36x4 36x4d	W	Republic, 20	3 1/2	3445	4 1/2 x 5 1/2	36x5 36x10	I	Traylor, E	4	4450	4 1/2 x 6	35x5 40x10	W
Mapleleaf, CC**	4	5770	4 1/2 x 5 1/2	36x5 36x5d	W	Rowe, CW	1 1/2	3800	4 1/2 x 5 1/2	36x6† 36x6†	W	Triangle, AA	5	4700	4 1/2 x 6	36x6 40x6d	W
Mapleleaf, DD**	5	6825	4 1/2 x 5 1/2	36x6 40x6d	W	Rowe, C. D. W.	2	3300	4 x 5	34x4 36x3 1/2d	W	Triangle, A	1 1/2	1385	3 1/2 x 5	34x4 1/2 34x4 1/2	I
Master, JW	1 1/2	2690	4 1/2 x 5 1/2	34x3 1/2 34x5	W	Rowe, G. S. W.	3	4150	4 x 6	34x5 36x5d	W	Triangle, C	2	2700	3 1/2 x 5 1/2	36x4 36x6	I
Master, W	2 1/2	3290	4 1/2 x 5 1/2	34x4 36x7	W	Rowe, C. P. W.	3	4250	4 1/2 x 5 1/2	38x7 42x9†	W	Triangle, B	2 1/2	2950	4 x 5 1/2	36x4 36x7	I
Master, D	2 1/2	3540	4 1/2 x 5 1/2	34x4 36x7	D	Rowe, HW	4	4500	4 1/2 x 6	36x5 36x6d	W	Triumph, G	1	1995	3 1/2 x 5 1/2	34x5† 34x5†	W
Master, A	3 1/2	4190	4 1/2 x 6	36x5 40x5d	D	Rowe, F. W.	5	5500	4 1/2 x 6	36x6 40x6d	W	Triumph, HC	1 1/2	2550	3 1/2 x 5 1/2	36x3 1/2 36x5	W
Master, E	3 1/2	4610	4 1/2 x 6	36x5 40x5d	D							Triumph, HB	2	2900	3 1/2 x 5 1/2	36x4 36x7	W
Master, B	5	5290	4 1/2 x 6 1/2	36x6 40x6d	D	Sandow, G	1	2295	3 1/2 x 5	34x3 1/							

Specifications of Current Motor Truck Models—Continued

NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES Front	TIRES Rear	Final Drive	NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES Front	TIRES Rear	Final Drive	NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES Front	TIRES Rear	Final Drive
Watson, E	1	\$1335	3 1/2 x 5 1/4	35x5 1/2	35x5 1/2	W	Wichita, S	5	\$5000	4 1/2 x 6	36x6	40x6d	W	Winther, 39	1 1/2	\$2450	3 1/2 x 5	34x3 1/2	34x5	W
Watson, N	3 1/2	4250	4 1/2 x 5 1/4	36x5	36x10	W	Wilcox, AA	1	2100	3 1/2 x 5 1/4	36x4	36x4	W	Winther, 49	2	3250	4 x 5	34x1	34x1d	W
Western, W1 1/2	1 1/2	2550	4 1/2 x 5 1/4	36x3 1/2	36x5	W	Wilcox, B	1 1/2	2775	4 1/2 x 5	36x4	36x5	W	Winther, 50	2 1/2	3925	4 x 6	33x7 1/2	42x9 1/2	W
Western, W1 1/2	1 1/2	2550	4 1/2 x 5 1/4	36x3 1/2	36x5	W	Wilcox, D	2 1/2	3300	4 1/2 x 5	36x4	36x3 1/2	W	Winther, 70	3 1/2	4200	4 x 6	36x5	36x5d	W
Western, W2 1/2	2 1/2	3250	4 1/2 x 5 1/4	36x4	36x7	W	Wilcox, E	3 1/2	4250	4 1/2 x 6	36x5	36x5 1/2	W	Winther, 450	2 1/2	3690	4 x 5	34x5	36x6	W
Western, L2 1/2	2 1/2	3250	4 1/2 x 6	36x4	36x7	W	Wilcox, F	5	5200	4 1/2 x 6 1/2	36x5	40x6d	W	Winther, 109	5	5250	4 1/2 x 6	36x6	40x5d	W
Western, W3 1/2	3 1/2	4250	4 1/2 x 6	36x5	40x5d	W	Wilson, F	1 1/2	2270	3 1/2 x 5	36x3 1/2	36x5	W	Winther, 140	7	5000	5 x 6	36x6	40x7d	W
White, 15	2 1/2	2400	3 1/2 x 5 1/4	34x5 1/2	34x5 1/2	B	Wilson, EA	2 1/2	2825	4 1/2 x 5 1/4	36x4	36x7	W	Wisconsin, B	1	1950	4 x 5 1/2	34x5 1/2	34x5 1/2	W
White, 20	2	3250	3 1/2 x 5 1/4	36x4	36x7	D	Wilson, G	3 1/2	3695	4 1/2 x 5 1/4	36x5	36x5d	W	Wisconsin, C	1 1/2	2300	4 1/2 x 5 1/4	36x6 1/2	36x6 1/2	W
White, 40	3 1/2	4200	3 1/2 x 5 1/4	36x5	40x5d	D	Wilson, H	5	4520	4 1/2 x 6	36x6	40x6d	W	Wisconsin, D	2 1/2	3500	4 1/2 x 5 1/4	36x6	36x10	W
White, 45	5	4500	4 1/2 x 5 1/4	36x6	40x6d	D	Winther, 751	1	1795	3 1/2 x 5	34x4 1/2	35x5 1/2	1	Wisconsin, E	3 1/2	4000	5 x 6 1/2	36x6 1/2	36x12 1/2	W
White Hick, E	1	1225	3 1/2 x 5	34x5 1/2	34x5 1/2	W	Winther, 430	1 1/2	2850	3 1/2 x 5	32x4	32x4	1	Witt-Will, N	1 1/2	2750	3 1/2 x 5	36x3 1/2	36x5	W
White Hick, H	1 1/2	1375	3 1/2 x 5	34x5 1/2	34x5 1/2	W								Witt-Will, P	2 1/2	3250	4 1/2 x 5 1/4	36x3 1/2	36x7	W
White Hick, K	2 1/2	1675	3 1/2 x 5	34x5	36x5	W								Wolverine, J	1	2125	3 1/2 x 5	34x3	34x4	W
Wichita, K	1	2200	4 1/2 x 5 1/4	36x4	36x5	W								Wolverine, J	1 1/2	2375	3 1/2 x 5	34x3 1/2	34x5	W
Wichita, L	1 1/2	2300	3 1/2 x 5 1/4	36x3 1/2	36x5	W								Wolverine, J	2	2640	3 1/2 x 5	34x4	34x7	W
Wichita, M	2	2800	3 1/2 x 5 1/4	36x3 1/2	36x5	W								Wolverine, J	2 1/2	3425	4 1/2 x 5 1/4	36x5	36x10	W
Wichita, R	2 1/2	3000	3 1/2 x 5 1/4	36x4	36x7	W								Wolverine, L	3 1/2	4100	4 1/2 x 5 1/4	36x5	36x10	W
Wichita, RX	2 1/2	3600	4 1/2 x 6	36x4	36x5	W								Yellow Cab, M21	3 1/2	2050	3 1/2 x 5	32x4	32x4	B
Wichita, O	3 1/2	4000	4 1/2 x 6	36x5	36x5d	W								Yellow Cab, M41	1 1/2	2350	3 1/2 x 5	34x4 1/2	34x4 1/2	W

*2-cyl. 16-cyl. 18-cyl. All others, not marked, are 4-cyl.
Trac. Tractor. **Canadian made.
Final Drive: W—Worm, I—Internal Gear, C—Chains, D—Double Reduction, B—Bevel, 4—Four-Wheel, E—External Gear. *Tires—optional. †Pneumatic Tires. All others solid.
†Price includes body. ‡Price includes several items of equipment.

Farm Tractor Specifications and Prices

TRADE NAME	Rating	Price	Wheels or Crawlers	Engine	Cylinders: Bore, Stroke	Fuel	Flow Capacity	TRADE NAME	Rating	Price	Wheels or Crawlers	Engine	Cylinders: Bore, Stroke	Fuel	Flow Capacity	TRADE NAME	Rating	Price	Wheels or Crawlers	Engine	Cylinders: Bore, Stroke	Fuel	Flow Capacity
All-In One.....	16-30	\$1975	3	Clim.	4-5 x 6 1/2	GDK	3-4	G-O.....G	14-28	\$1485	4	Wauk.	4-4 1/2 x 5 1/2	G or K	3	Port Huron .A	12-25	\$1700	4	Chief	4-3 1/2 x 6	G,K	3
Allis-Chalm. B	6-12	925	2	LeR.	4-3 1/2 x 4 1/2	Gas.	1	Grain Belt...A	18-36	2150	4	Wauk.	4-4 1/2 x 6 1/2	G or K	4	Prairie Dog...L	9-18	650	3	Wauk.	4-3 1/2 x 5 1/2	Gas.	2
Allis-Chal.G.P	6-12	850	2	LeR.	4-3 1/2 x 4 1/2	Gas.	1-2	Gray.....1920	18-36	2000	3	Wauk.	4-4 1/2 x 6 1/2	Gas.	4	Prairie Dog...D	15-30	1250	4	Wauk.	4-4 1/2 x 6 1/2	Gas.	2
Allis-Chalm....	12-20	1495	2	Midw.	4-4 1/2 x 5 1/2	Gas.	2-3	Ground Hog...	19-31	2000	4	Erd.	4-4 x 6	G or K	3	Ranger Cul.							
Allis-Chalm....	18-30	2150	4	Own	4-4 1/2 x 6 1/2	G,K	3-4	Gt. Western St.	20-30	1950	4	Beav.	4-4 1/2 x 6	K	4	T-20	8-16		4	LeR.	4-3 1/2 x 4 1/2	Gas.	1
Allis-Chalm....	10-18	875	4	Own	4-4 1/2 x 6 1/2	G,K	4	Hart-Parr...20	20	995	4	Own	2-5 1/2 x 6 1/2	K,D	2	Reed.....A-1	15-30	1985	4	Wauk.	4-4 1/2 x 6 1/2	G or K	3-4
Allwork...2-G	14-28	1875	4	Own	4-4 1/2 x 6	GorK	3	Hart-Parr...30	30	1595	4	Own	2-6 1/2 x 7	K,D	3	Reed.....A-1	18-36	2185	4	Wauk.	4-5 x 6 1/2	Gas.	4
Allwork.....C	18-36	1675	4	Own	4-5 x 6	GorK	3	Heider.....C	9-16	1170	4	Wauk.	4-4 1/2 x 6 1/2	G,K	2	Reliable.....	10-20	885	4	Own	2-6 x 7	Ker.	2
AndrewsKin.D	18-36	2500	4	Clim.	4-5 x 6 1/2	GorK	4	Heider.....D	12-20	1395	4	Wauk.	4-4 1/2 x 6 1/2	G,K	3	Rex.....	12-25	1600	4	Wauk.	4-4 1/2 x 5 1/2	G or K	3
Appleton.....	12-20	1500	4	Buda	4-4 1/2 x 5 1/2	G,K	2-3	Heider.....Cult	6-10	1050	4	LeR.	4-3 1/2 x 5 1/2	Gas.	1	Russell.....	12-24	1500	4	Own	4-4 1/2 x 5 1/2	G or K	2-3
Aro.....1921	3-5	550	4	Own	1-4 1/2 x 5	Gas.	1	Hicks.....	20-30	1000	4		4-4 1/2 x 6	K or G	4	Russell.....	15-30	2200	4	Own	4-5 x 6 1/2	G or K	3-4
Aultman-T....	15-30	2200	4	Clim.	4-5 x 6 1/2	G,K	4	Huber Light 4	12-25	1185	4	Wauk.	4-4 1/2 x 5 1/2	G or K	3	Russell.....	20-35	3000	4	Own	4-5 1/2 x 7	G or K	4-5
Aultman-T....	22-45	3850	4	Own	4-5 1/2 x 8	G,K	6	Huber Super 4	15-30	1885	4	Midw.	4-4 1/2 x 6	Gas	3	Russell.....	30-60	5000	4	Own	4-8 x 10	G or K	8-10
Aultman-T....	30-60	5000	4	Own	4-7 x 9	G,K,D	8	Illinois, Super	18-36	2375	4	Clim.	4-5 x 6 1/2	G,K	4	Samson.....M	10-20	1250	4	Nor	4-4 x 5 1/2	G,K	2
Automot. B-3	12-24	1785	4	Here.	4-4 x 5	Gas.	2-3	Imperial.....E	40-70	5000	4	Own	4-7 1/2 x 9	G,K,D	10	Sandusky.....J	15-35	1750	4	Own	4-4 1/2 x 5 1/2	G,K,D	2
Avery,SR.Cul.	5-10		4	Own	4-3 x 4	G,K	2	Indiana.....F	5-10	895	2	LeR.	4-3 1/2 x 4 1/2	Gas.	1-2	Shawnee Com.	6-12		2	LeR.	4-3 1/2 x 4 1/2	Gas.	10
Avery...Cult-C	5-10		3	Own	4-3 x 4	G,K	2	International	8-16	900	4	Own	4-4 1/2 x 5	G,K,D	2	Shawnee Com.	9-18		2	Gray	4-3 1/2 x 5	G,K	3
Avery.....C	5-10		4	Own	6-3 x 4	G,K	2	International	15-30	1750	4	Own	4-5 1/2 x 8	G,K,D	2	Shelby.....D	15-30		4	Beav.	4-4 1/2 x 6	G,K	3
Avery.....C	8-16		4	Own	2-5 1/2 x 6	G,K,D	2-3	International	20-40	3485	*2	Chief	4-4 1/2 x 6	G,K,D	3-4	Shelby.....C	10-20		4	Erd.	4-4 x 6	G or K	2-3
Avery.....C	12-20		4	Own	4-4 1/2 x 6	G,K,D	2-3	J-T.....N	20-40	1650	4	Clim.	4-5 x 9	Gas	4-6	Short Turn...	20-40	1500	3	Beav.	4-4 1/2 x 6	G or K	3
Avery.....C	12-25		4	Own	2-6 1/2 x 7	G,K,D	3-4	Klumb.....	16-32	1650	4	Own	4-5 x 9	Gas	4-6	Square T...A	18-35	2075	3	Clim.	4-5 x 6 1/2	K,G	3
Avery.....C	14-28		4	Own	4-4 1/2 x 7	G,K,D	3-4	Knudsen.1920	25-45	2500	4	Clim.	4-5 x 9	Gas	4-6	Steady Pull...	12-21	1485	4		4-4 x 5	Gas.	3
Avery.....C	18-36		4	Own	4-5 1/2 x 6	G,K,D	4-5	LaCrosse...M	6-12	650	4	Own	2-4 x 6	G,K	1	Stinson...4E	18-36	1835	4	Beav.	4-4 1/2 x 6	G,K	4
Avery.....C	25-50		4	Own	4-6 1/2 x 7	G,K,D	5-6	LaCrosse...G	12-24	985	4	Own	2-6 x 7	G or K	3	Stone.....	20-40	2250	4	Beav.	4-4 1/2 x 6	G,K	4
Avery.....C	45-65		4	Own	4-7 1/2 x 8	G,K,D	3-10	Lauson.....	12-25	1495	4	Midw.	4-4 1/2 x 5 1/2	Gas.	3	Tiga.....3	15-27	2625	4	Wisc.	4-4 1/2 x 6	Gas.	3-4
Bates.....	15-25		4	Own	4-4 1/2 x 6	Ker.	3	Lauson.....21	15-30	1985	4	Beav.	4-4 1/2 x 6	G or K	3-4	Titan.....	10-20	900	4	Own	2-6 1/2 x 8	G,K,D	3
Bates Mule. H	18-25		*2	Midw.	4-4 1/2 x 5 1/2	Gas.	3	Lauson Road	15-30	2225	4	Beav.	4-4 1/2 x 6	K	3-4	Topp.....B	30-35	3500	4	Wauk.	4-4 1/2 x 6 1/2	G,K	3-4
Bates Mule. F	25-35		*2	Midw.	4-4 1/2 x 6	Gas.	com.	Leader.....B	12-18	1095	4	Own	2-6 x 6 1/2	G,K,D	2-3	Toro Cultivator	6-10		3	LeR.	4-3 1/2 x 4 1/2	Gas.	2
Beane.....G	8-16		*1	Own	4-3 1/2 x 4	G,K	2-3	Leader.....N	16-32	1985	4	Clim.	4-5 x 6 1/2	G,K	3-4	Townsend...	10-20	895	2	Own	4-6 1/2 x 7	Ker.	2-3
Beeman.....G	2-4	315	4	Own	1-3 1/2 x 4	Gas.	1/2	Leader.....GU	18-35	2775	*2	Clim.	4-5 x 6 1/2	G,K	3-4	Townsend...	15-30	1485	2	Own	4-7 x 8	Ker.	3-4
Best.....	60		*2	Own	4-4 1/2 x 6 1/2	G,K,D	4	Leonard...E	20-30	2530	4	Buda	4-4 1/2 x 6	G,K	3	Townsend...	25-50	2750	2	Own	4-8 1/2 x 10	Ker.	4-8
Best.....	60		*2	Own	4-6 1/2 x 8 1/2	G,K,D	8-9	Liberty...A	18-32	2175	4	Clim.	4-5 x 6 1/2	G,K	4	Traction Motor	40-60		4		8-3 1/2 x 5	Gas.	4-5
Boring...1921	1850		3	Wauk.	4-4 1/2 x 5 1/2	GorK	2	Linn.....H4J	40	4500	*2	Cont.	4-4 1/2 x 5 1/2	Gas	4	Traylor...TB	6-12	715	4	LeR.	4-3 1/2 x 4 1/2	Gas.	1-2
Burn-Oil, 1921	15-30	1650	4	Own	2-6 1/2 x 7	Ker.	3-4	Linn.....W	60	5100	*2	Wauk.	4-5 x 6 1/2	Gas	6	Triumph...H	18-36	2450	2	Erd.	4-4 x 6	Ker.	4
Capital.....	15-30	1000	2	Own	4-4 1/2 x 6	Gas.	3	Little Giant..B	16-22	2200	4	Own	4-5 1/2 x 6	K	6	Trundaar...10	25-40	3750	*2	Wauk.	4-4 1/2 x 6	G or K	4
Case.....	10-18	800	4	Own	4-3 1/2 x 5	GorK	2	Little Giant..A	26-35	3300	4	Own	4-5 1/2 x 6	K	6	Turner...1921	14-25	1295	4	Buda	4-4 1/2 x 5 1/2	G,K	3
Case.....	15-27	1680	4	Own	4-4 1/2 x 6	GorK	3	Lombard.....	85-150		*2		4-4 1/2 x 6 1/2	Gas.	16	Twin City....	12-20	1580	4	Own	4-4 1/2 x 6	G,K	3
Case.....	22-40	3100	4	Own	4-5 1/2 x 6 1/2	GorK	4-5	Lombard.....	50		*2		4-4 1/2 x 6 1/2	Gas.	16	Twin City....	20-35	3175	4	Own	4-5 1/2 x 6 1/2	G,K	5
Caterpillar T11	40	4250	*2	Own	4-4 1/2 x 6	Gas.	4	Magnet.....B	14-28	1875	4	Wauk.	4-4 1/2 x 6 1/2	K&G	3	Twin City....	40-65	5250	4	Own	4-7 1/2 x 9	G,K	8
Caterpillar T16	40	6500	*2	Own	4-6 1/2 x 7	Gas.	4	Master Jr....	5-10	535		LeR.	4-3 1/2 x 4 1/2	Gas.	1	Uncle Sam C20	12-20	1385	4	Weid.	4-4 x 5 1/2	G	2-3
Centaur.....	5-2 1/2	405	3	N Way	2-1 1/2 x 4 1/2	GorK	1	MerryGar1921	2	230		LeR.	4-3 1/2 x 4 1/2	Gas.	3-4	Uncle Sam B19	20-30	2300	4	Beav.	4-4 1/2 x 6	G or K	3-4
Chase.....	12-25	1725	3	Buda	4-4 1/2 x 5 1/2	G,K	2-3	Minne...All-P	12-25	1200	4	Own	4-4 1/2 x 7	G or K	3	Uncle Sam D21	20-30	1685	4	Beav.	4-4 1/2 x 6	G or K	3-4
Chase.....40	40	2500	4	Own	4-4 1/2 x 6	G,K	2-3	Minne...Gen.P	17-30	1850	4	Own	4-4 1/2 x 7	G or K	3-4	Universal...	1-4	475	2	Own	1-3 1/2 x 5	G	1
Cletrac.....W	9-16	845	*2	Own	4-3 1/2 x 4 1/2	G,K,D	2-12	Minne.....	22-44	3300	4	Own	4-6 x 7	G or K	5-6	Utilitor.....501	2 1/2	380	4	Own	1-3 1/2 x 4 1/2	G	1
Cletrac.....W	12-20	1495	*2	Own	4-4 x 5 1/2	G,K,D	2-14	Med.Duty	22-44	3300	4	Own	4-6 x 7	G or K	5-6	Victory.....1921	9-18	1350	4	Gray	4-3 1/2 x 5	Gas.	1
Dakota.....	15-27	1750	3	Dom.	4-4 x 6	Gas.	3	Minne.....	22-44	3300	4	Own	4-6 x 7	G or K	5-6	Victory.....1921	15-30	1750	4	Wauk.	4-4 1/2 x 5 1/2	Gas.	3
Dart.....B.J.	15-30	2100	4	Buda	4-4 1/2 x 6	Gas.	3-4	HeavyDuty	35-70	4600	4	Own	4-7 1/2 x 9	G or K	8-9	Vim.....K	15-30	1650	4	Wauk.	4-4 1/2 x 5 1/2	G,K	3
Depue.....A	20-30	2500	4	Buda	4-4 1/2 x 6	Gas.	3	Mohawk. 1921	8-16	785	2	Light	4-3 1/2 x 4 1/2	G or G	1-2	Wallis.....B	15-25	1600	4	Own	4-4 1/2 x 5 1/2	G,K	3
Dill.....R.W.	20	2480	4	Cont.	4-4 1/2 x 5 1/2	Gas.	3	Moline Univ D	9-18	990	2	Own	4-3 1/2 x 5	Gas.	2-3	Waterloo...N	12-25	1450	4	Own	2-6 1/2 x 7	G,K	3
Dill.....R.W.	20	2980	4	Midw.	4-4 1/2 x 6	Gas.	3	Moline Orch.	9-18	1075	2	Own	4-3 1/2 x 5	Gas.	2-3	Webfoot...53	28-53	5000	*2	Wisc.	4-5 1/2 x 7	G,D	0
Do-It-All.....	3-6	595	4	Own	1-4 1/2 x 5	Gas.	1	Motor Macult.	1 1/2	195	2	Own	1-2 1/2 x 3 1/2	Gas.	1	Wellington.B	12-22		4	Erd	4-4 x 6	Ker.	2-3
Eagle.....F	12-22	1100	4	Own	2-7 x 8	GorK	3-5	Motor.....	15-30	2250	4	Buda	4-3 1/2 x 6	Gas.	3-4	Wellington.F	16-30		4	Chief	4-4 1/2 x 6	G,K	3-4
Eagle.....F	16-30	1850	4	Own	2-8 x 8	GorK	3-5	Motor.....	15-30	2250	4	Buda	4-3 1/2 x 6	Gas.	3-4	Western, 1920	16-32	2100	4	Clim.	4-4 x 6 1/2	Gas.	4
E-B.....AA	12-20	1445	4	Own	4-4 1/2 x 5	G,K,D	3	NB.....1	2	425	2	Own	2-3 1/2 x 4	Gas.	3	Wetmore...	12-25	1650	4	Wauk.	4-4 x 6 1/2	Gas.	4
E-B.....Q	12-20	925	4	Own	4-4 1/2 x 5	G,K,D	3	Nichols-Shep.	23-42	3100	4	Own	2-3 1/2 x 4	Gas.	3	Wharton....E	12-20	1800	3	Buda	4-4 1/2 x 5 1/2	G,K	2
E-B.....	16-32	2000	4	Own	4-5 1/2 x 7	G,K,D	4	Nichols Shep.	23-42	3100	4	Own	2-3 1/2 x 4	Gas.	3	Whitney.....	9-18		4	Own	2-5 1/2 x 6 1/2	Gas.	2
E-B.....	18-30	2000	4	Buda	4-4 1/2 x 6	G,K	3	Nichols Shep.	25-50	3460	4	Own	2-3 1/2 x 4	Gas.	3	Wichita.....T	15-30	2000	4	Beav.	4-4 1/2 x 6	G,K,D	3-4
Evans.....	9-12	1525	4	Lyc.	4-3 1/2 x 5	Gas.	2	Nilson Jr....E	15-25	1775	4	Wauk.	4-4 1/2 x 6 1/2	G or K	3	Wisconsin.E	16-30	2250	4	Clim.	4-5 x 6 1/2	G or K	3
Fagool.....D	18-30	1885	4	Clim.	4-5 x 6 1/2	G,K	3-4	Nilson Senior.	20-40	2475	5	Wauk.	4-5 x 6 1/2	G,K	4	Wisconsin.F	20-40	2450	4	Wauk.	4-5 x 6 1/2	G or K	4
Farm Horse.B	15-25		4	Buda	4-4																		

COMING MOTOR EVENTS

AUTOMOBILE SHOWS

Birmingham	Annual Automobile Show	Oct. 24-29
Little Rock, Ark.	Little Rock Automobile Dealers' Assn.	Nov. 11-19
Jersey City	Second Annual Show	Nov. 14-19
Chicago	Automotive Equipment Show	Nov. 14-19
Cincinnati	Automotive Equipment Exposition	Nov. 26-Dec. 3
New York	Automobile Salon	Nov. 27-Dec. 3
London, Ontario	National Motor Show of Western Canada	January
New York	National Automobile Show	Jan. 7-13
Buffalo	Buffalo Automobile Dealers' Assn.	Jan. 14-21
Oakland, Calif.	Automobile Show	Jan. 16-22
Milwaukee	Fourteenth Annual Automobile Show	Jan. 19-25
Cleveland	Cleveland Automobile Mfrs. and Dealers' Assn.	Jan. 21-28
Chicago	National Automobile Show	Jan. 28-Feb. 3
Chicago	Automobile Salon	Jan. 28-Feb. 3
Minneapolis	Tractor Show	Feb. 6-11
Minneapolis	Automobile Show	Feb. 6-11
Winnipeg, Canada	Canadian Automotive Equipment Assn. Show	Feb. 6-11
Kansas City	Kansas City Motor Car Dealers' Assn.	Feb. 9-16
Atlanta	Southern Automobile Show	Feb. 11-18
San Francisco	Sixth Annual Pacific Automobile Show	Feb. 11 to 18
Louisville, Ky.	Fourteenth Annual Automobile Show	Feb. 20-25
Syracuse	Fourteenth Annual Automobile Show	Feb. 20-25
Des Moines	Winter Automobile Show	Feb. 26-March 3
Springfield, Mass.	Seventh Annual Automobile Show	Feb. 27-March 4
Brooklyn	Eleventh Annual Show	March 4-11
Boston	Annual Automobile Show	March 11-18
Newark, N. J.	Newark Automobile Dealers' Assn.	March 11-18

RACES

Los Angeles	Speedway Race	Nov. 24
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FOREIGN SHOWS

Olympia, England	Automobile Show	Nov. 3-12
London	British Motor Show, Motor Mfgs. and Traders	Nov. 4-11
Paris	Aviation Exhibition	Nov. 12-27
Santiago, Cuba	Annual Automobile Show	March, 1922
Rio de Janeiro, Brazil	Automotive Exhibition	September, 1922

CONVENTIONS

Oakland, Calif.	International Traffic Officers' Assn.	Oct. 24-29
Omaha	International Automobile Congress	Nov. 3-5
Cleveland	National Tire Dealers' Association	November
Harrisburg	Pennsylvania Automotive Assn.	Nov. 9-10
Chicago	Annual Meeting and Business Exhibits of Automotive Equipment Assn.	Nov. 14-19
Chicago	Research Club Convention	Nov. 14
New York	Factory Service Managers' Convention	Nov. 15-16
Columbus, O.	Ohio Automotive Trade Assn. Meeting	Dec. 12-14
Chicago	American Road Builders' Convention and Show	Jan. 17-20

SINCERE INTEREST IN EMPLOYEES PAYS

(Continued from page 13)

"To be ready to start work at 7:30 o'clock in the morning and to give the best that is in us each day.

"To say 'Good morning' with a smile when we come in in the morning.

"To always consider the car owners' interests as well as those of our employers'.

"To practice courtesy at all times among ourselves as well as to the car owners and to the public.

"To attend regularly the monthly meetings and to have prepared at least one suggestion for each meeting.

"To study the Cadillac car.

"To reflect ourselves in our work.

"To look upon every piece of work that we do as absolutely the best we can do and to have it measure up to Cadillac quality.

"To refuse unflinchingly to turn a piece of work that is not honestly done.

"To be truthful—not because there is

a law against deception—but because it is right.

"To uphold to the fullest extent the policies as laid down by our employers as long as they do not conflict with the principles as outlined in the above resolutions."

OVERLAND KEEPS \$6,000,000 CASH

Toledo, Oct. 22—Willys-Overland, after payment of another 10 per cent on its bank loans on Nov. 1, reducing them to \$16,000,000 from the peak of \$43,000,000 only a few months ago, will still have about \$6,000,000 in cash.

SALES AGENT GETS \$55,000 DAMAGE

Charlotte, N. C., Oct. 21—Damage in the sum of \$55,000 was awarded to the Southern Automatic Steam Carburetor Co., of Charlotte, against the Automatic Steam Carburetor Co., of Chicago, in Federal court here. The plaintiff company asked for \$150,000. The defendant, through counsel, gave notice of appeal. When perfected, the appeal will go to

Los Angeles Prepares for \$35,000 Thanksgiving Race

Ask A. A. to Raise Number of Starters in 250-Mile Event from 18 to 25

LOS ANGELES, Oct. 24—Determined to make the annual Thanksgiving day motor race at Beverly the real classic of the two-miles-a-minute sport, the directors of the Los Angeles Speedway Assn. approved plans which have been in a formulative state for several weeks. The officials went on record as favoring but two events annually within the confines of the famous board oval, the Thanksgiving race, which will be 250 miles, and a series of sprint races to be held later in the spring than heretofore.

The prize list will amount to a total of \$35,000, \$10,000 of the amount being made up by the merchants' lap prize fund. This will make the Los Angeles race the richest event per mile in the country. While the rules of the American Automobile Assn. prohibit the starting of more than 18 cars on the speedway, application has been made to the contest board to raise the limit to 25 starters. Many new cars, particularly those which have won big races in Europe and the east, will be seen here for the first time. These cars and drivers are not to compete in any other Pacific coast races before the Thanksgiving day event.

PACKARD REDUCES SINGLE SIX

Detroit, Oct. 25—The Packard Motor Car Co. has made a reduction of \$625 on all models of the Single Six. The new prices compared with the old are as follows:

	Old	New
Touring and Roadster	\$2975	\$2350
Coupe	3750	3125
Sedan	3975	3350

ESSEX AGAIN REDUCES PRICE

Detroit, Oct. 22—Price reductions on Essex cars made this week bring the line to the lowest price at which it has ever sold. Open models are now \$1195, which is \$180 lower than ever before. On the cabriolet the price has been reduced to \$1395 and on the sedan to \$1995. This represents in the enclosed model a reduction of \$600 since September, 1920, and of \$200 since June of this year. The reduction is declared by the company to be based upon anticipated market conditions in 1922.

the United States Circuit Court of Appeals at Richmond, Va.

The Southern Automatic Steam Carburetor Co. bought territorial rights for the steam carburetor appliance from the parent company at Chicago, having most of the southeastern states as territory. It was claimed by the plaintiff that the appliance proved to be of no benefit to an automobile, but a positive hindrance, and that the parent company misrepresented the appliance in selling the territory.